Shanghai Liangxin Electrical Co., Ltd.

NDM5E-400/630 Molded Case Circuit Breakers

Product Specification

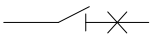
（IPD-ENG-DEV-T22 A1 2016-09-23）

Prepared	杨荣荣	Date	2022-12-07
Reviewed	徐君成	Date	2022-12-09
Countersign	黄金华	Date	2022-12-12
Approved	丁飞	Date	2022-12-13

Revision information					
Version	Revised contents and reasons	Date	Prepared	Reviewed	Approved
0	Newly added	2016-10-18	Xu Juncheng	Yang Wenxue	Huang Yinfang
1	Change GB to GB/T Change product's picture Modify table 14：Copper busbar（quantity×size） Modify the picture of handle operation	2018-09-11	Xu Juncheng	Yang Wenxue	Sun Conglin
2	Update specification and model description and add relevant contents of accessories.	01/13/2020	Wu Yali	Feng Daijun	Wu Chunyan
3	Change operation mode and model	02/25/2020	Wu Yali	Feng Daijun	Wu Chunyan
4	Rewrite for new template	04/07/2020	Wu Yali	Feng Daijun	Wu Chunyan
5	Update product related information	08/07/2022	Yang rong rong	Wang Hu	Jiang Wu shan
6	Add the terminal pin to the accessory package	05/12/2022	Yang rong rong	Xu jun cheng	Ding fen

1. Application

NDM5E-400/630 series molded case circuit breaker (hereinafter "breaker") is suitable for power distribution in 50/60Hz circuits with rated insulation voltage of 1000V, rated working voltage of AC400/415V or AC500V or AC690V and rated current of 400A or 630A. It is used to distribute electric energy. In addition to the functions of long time delay inverse time limit of overload, short time delay definite time limit of short circuit, short time delay inverse time limit of short circuit, short circuit instantaneous time, grounding, overload alarm, alarm without tripping, it can protect the line and power equipment from damage and damage. It also has the functions of feedback the current, voltage, power, electric energy, frequency, life and minute to the upper computer or other energy efficiency management system. Information such as closing status and operation times are used for detection and monitoring of circuit breakers, reducing the operation and maintenance cost of power grid, and providing necessary data for future energy efficiency system.

The breaker has disconnecting function. Its corresponding symbol is shown as: 

The breaker meets the criterion IEC 60947-2, GB 14048.2.

Each voltage level and short-circuit section capacity of the circuit breaker can be connected with the lower incoming line.

2. Product pctures (The pictures are for reference only, and the details shall be subject to the real object)

Fig.1 Picture of Product

3. Model and implication

ble 1 Model Interpretation

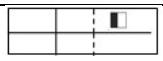
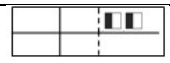
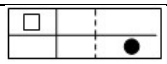
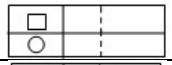
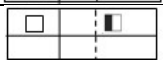
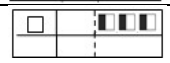
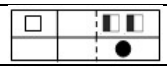
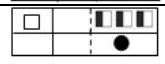
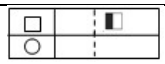
ND □ M □ 5 □ □ - □ □ □ / □ / □ / □ □ □ □
1 2 3 4 5 6 7 8 9 10 11 12 13

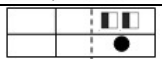
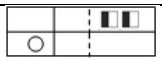
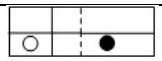
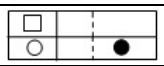
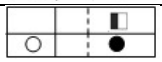
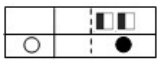
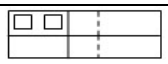
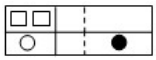
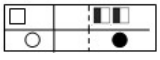
S.N.	Name of S.N.	Interpretation
1	Enterprise characteristic code	ND：Nader low-voltage apparatus
2	Product type code	M：Molded case circuit breaker (MCCB)
3	Design S.N.	5
4	Derived code	E: Electronic
5	Current of the frame size (A)	400, 630
6	Interrupting level code	L:standard
		M:medium-high
		H:high
7	Rated current(A)	400、630
8	Pole	3:3 poles
		4C: N-pole is with the over-current protection and acts together with other three poles(N-pole close first and open last)
		4D: N-pole is without the over-current protection and always connect
9	Trip release code	ETB: electronic release (3P/4P products)
		ETC: intelligent release (3P/4P products)
		ETC-P: energy efficiency intelligent release
		ETB-T: communication electronic release
		ETC-T: communication intelligent release
		ETB-PT：communication energy efficiency electronic release
		ETC-PT: communication energy efficiency intelligent release
10	Installation code+ Wiring method	Null: Stationary connector + front panel wiring
		ES：Stationary connector+ front extension wiring board
		R1：Fixed type+ horizontal wiring behind terminal
		P0FH：plug-in without secondary connector +horizontal wiring in front of board
		P0RH：plug-in without secondary connector + horizontal wiring behind the board
		P1FH：plug-in with secondary connector + horizontal wiring in front of board

		P1RH：plug-in with secondary connector + horizontal wiring behind the board
		W0FH：withdrawable non secondary terminal horizontal wiring in front of board
		W0RH：withdrawable non secondary terminal + horizontal wiring behind the board
		W1FH：withdrawable type with terminal block +horizontal wiring in front of board
		W1RH：withdrawable type with terminal block + horizontal wiring behind the board
11	Operation method	Null：direct handle operation
		Z1A150：rotary handle with round hole and square axis length 150mm
		Z1A200：rotary handle with round hole and square axis length 200mm
		Z1A300：rotary handle with round hole and square axis length 300mm
		Z1A350：rotary handle with round hole and square axis length 350mm
		Z1A650：rotary handle with round hole and square axis length 650mm
		Z1F150：rotary handle with square hole and square axis length 150mm
		Z1F200：rotary handle with square hole and square axis length 200mm
		Z1F300：rotary handle with square hole and square axis length 300mm
		Z1F350：rotary handle with square hole and square axis length 350mm
		Z1F650：rotary handle with square hole and square axis length 650mm
		Z2A150：Circular eccentric hole rotary handle + shaft length 150mm
		Z2A200：Circular eccentric hole rotary handle + shaft length 200mm
		Z2A300：Circular eccentric hole rotary handle + shaft length 300mm
		Z2A350：Circular eccentric hole rotary handle + shaft length 350mm
		Z2A650：Circular eccentric hole rotary handle + shaft length 650mm
		Z2F150: Square eccentric hole rotary handle + shaft length 150mm
		Z2F200: Square eccentric hole rotary handle + shaft length 200mm
		Z2F300: Square eccentric hole rotary handle + shaft length 300mm

		Z2F350: Square eccentric hole rotary handle + shaft length 350mm
		Z2F650: Square eccentric hole rotary handle + shaft length 650mm
		M02：motor operation DC24V
		M11：motor operation AC110V/DC110V
		M22：motor operation AC230V/DC220V
		M40：motor operation AC400V
12	Accessory code	See table 2
13	Other codes	J:Mechanical interlocking
		MS2：MS2 lock

Table 2 Accessory Code

Accessory code	Accessory name	Installation position 3P/4P
----	None	———
08	Alarm contact	
10	Shunt release	
30	Under-voltage release	
21	Single auxiliary contact	
61	Two sets of single auxiliary contacts	
23	Three sets of single auxiliary contacts	
18	Shunt release, alarm contact	
38	Under-voltage release, alarm contact	
22	Single auxiliary contact, alarm contact	
88	Two sets of single auxiliary contacts, alarm contact	
26	Three sets of single auxiliary contacts, alarm contact	
42	Shunt release, single auxiliary contact, alarm contact	
44	Shunt release, two sets of single auxiliary contacts, alarm contact	
46	Shunt release, three sets of single auxiliary contacts, alarm contact	
75	Under-voltage release, single auxiliary contact, alarm contact	
77	Under-voltage release, two sets of single auxiliary contacts, alarm contact	
81	Under-voltage release, three sets of single auxiliary contacts, alarm contact	

41	Shunt release, single auxiliary contact	
11	Shunt release, two sets of single auxiliary contacts	
12	Shunt release, three sets of single auxiliary contacts	
71	Under-voltage release, single auxiliary contact	
72	Under-voltage release, two sets of single auxiliary contacts	
73	Under-voltage release, three sets of single auxiliary contacts	
50	Shunt release, Under-voltage release	
31	Alarm contact, Shunt release, Under-voltage release	
51	Shunt release, Under-voltage release, Single auxiliary contact	
52	Shunt release, Under-voltage release, two sets of single auxiliary contacts	
53	Shunt release, Under-voltage release, three sets of single auxiliary contacts	
98	Two sets of single alarm contact	
63	Two sets of single alarm contact, single auxiliary contact	
64	Two sets of single alarm contact, two sets of single auxiliary contacts	
65	Two sets of single alarm contact, three sets of single auxiliary contacts	
37	Two sets of single alarm contact, Shunt release, Under-voltage release	
39	Two sets of single alarm contact, Shunt release, Under-voltage release, single auxiliary contact	
55	Two sets of single alarm contact, Shunt release, Under-voltage release , two sets of single auxiliary contacts	
56	Two sets of single alarm contact, Shunt release, Under-voltage release , three sets of single auxiliary contacts	
32	Alarm contact, Shunt release, Under-voltage release, single auxiliary contact	
33	Alarm contact, Shunt release, Under-voltage release, two sets of single auxiliary contacts	
34	Alarm contact, Shunt release, Under-voltage release, three sets of single auxiliary contacts	

Note: ◧Single auxiliary contact; □ Alarm contact; ●Shunt release; ○Under-voltage release.

The position for shunt release and Undervoltage release is exchangeable. When there is only one accessory in the order, the default position is bottom-left.

The ETB-T/ETC-T/ETC-P/ETB-PT/ETC-PT in NDM5E-400/630 has no three auxiliary codes.

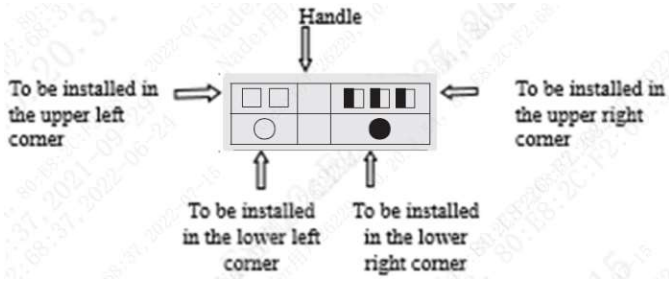


Fig2. Diagram for Accessory Installation

4. Main technical parameters

Table 3 Main Technical Parameters for NDM5E-400/630

Frame current Inm (A)			400			630		
Rated current In (A)			400			630		
Rated voltage Use (V)			AC400/415 、AC500、AC660/690					
Rated impulse withstand voltage Uimp (1s)			8000V					
Rated insulation voltage Ui (V)			1000V					
Power frequency withstand voltage (1min)			4000V					
Rated short-time withstand current(kA/1s)			5			8		
Pole			3、4			3、4		
Icu/ Ics (kA)		Code	L	M	H	L	M	H
		AC400V/ AC415V	70	100	150	70	100	150
		AC500V	50	70	85	50	70	85
		AC690V	20	30	40	20	30	40
Rated Service short-circuit breaking Capacity Ics (kA)			Ics=100%Icu					
Life （times）	Mechanical life	Maintainable free life	20000					
		Maintainable life	40000					
	Electrical life	AC400V/415V	7000			5000		
		AC500V	5000			3500		
		AC690V	3000			2000		
External dimension		L(mm)	250					
		W(mm)	140(3P)/185(4P)					
		H(mm)	110					
Flashover distance (mm)			≤100					

Note：The overall dimension does not include the dimension of terminal cover。

4.1 Sectional area and applicable rated current adopted in wiring

Table 5 Wiring Wire Parameters

Rated current（A）	400	630
Sectional area of conductor（mm2）	240	2×185
Copper bar（Number×Size）	/	2×32mm×6mm

4.2 Tightening Torque of the Circuit Breaker Terminal and Mounting Screw

Table 6 Screw Parameter

Tightening torque of connecting screw M10（N•m）	20
Tightening torque of mounting screw M5（N•m）	4

4.3 Derating factor of temperature change for the circuit breaker

Table 7 Deration Factor Table of Temperature Change for the Circuit Breaker

Model	Deration factor of product temperature change							
	Temperature(℃)	40	45	50	55	60	65	70
NDM5E-400	Deration factor	1.0	1.0	1.0	0.97	0.94	0.9	0.85
NDM5E-630	Deration factor	1.0	1.0	1.0	0.96	0.92	0.88	0.83

Note: 1)When the operating ambient temperature is below + 50℃, and do not need to reduce capacity。

2)The above deration factors are measured under the rated current of the shell frame。

4.4 High altitude deration factor of circuit breaker

Table 8 Altitude drop correction factor

Altitude (m)	Working current correction coefficient	Maximum operating voltage(V)	Power frequency withstand voltage (V)	Average insulation class (V)
2000	1	690	4000	1000
2500	1	690	4000	1000
3000	0.98	620	3600	900
3500	0.97	580	3400	850
4000	0.95	550	3200	810
4500	0.94	520	3000	770
5000	0.93	500	2800	730

4.5 Power consumption of circuit breaker

Table 9 NDM5E-160 Product current specification single phase power consumption able

Model	Current specification	Single phase power consumption (W)		
		Front and rear wiring	Plug in front of plate、rear board wiring	Extended row wiring
NDM5E-400	400A	19.5	28	20.7
NDM5E-630	630A	39.2	49	40.7
Note：The above data are the single-phase loss measured under the rated current of the circuit breaker when the ring temperature is 40℃。				

5、Normal Working Environment of Circuit Breaker

1）The altitude of the installation site doesn't exceed 2,500m. See the "High-altitude Derating Factor Table of Circuit Breaker" for the derating factor at the altitude;

2）The ambient temperature is -35℃ ~+70℃; the average within 24 h shall not be more than +35℃. If the ambient temperature is higher than +50℃, the user needs to reduce the capacity. See the "Derating Factor Table of Temperature Change for the Circuit Breaker" for the derating factor;

3）Its relative humidity at an ambient temperature of +40℃ should not exceed 50%. A higher relative humidity is allowed at a lower temperature. For example, the relative humidity at 20℃ can reach 90%; for frost due to temperature change, the corresponding measures should be taken;

4）The product can withstand the effects of wet air, salt mist, oil mist and mould;

5）The installation category of the circuit breaker connected to the main loop is: Category Ⅲ (power distribution and control level), The installation category of the circuit breaker not connected to the main loop is: Category Ⅱ (load level);

6）The pollution level is Level 3;

7）Degree of protection : IP 20;

8）The product should be installed in places that are free from explosive media, media corrosive to metal, insulation damaging gas, and conductive dust, which should be also avoided from snow and rain;

9）In case of stricter user conditions than the above description, negotiate with the manufacturer.

6. Time-Current Curves (tripping characteristic)

6.1 Tripping characteristics curve under normal environment (ambient air temperature: +50℃)

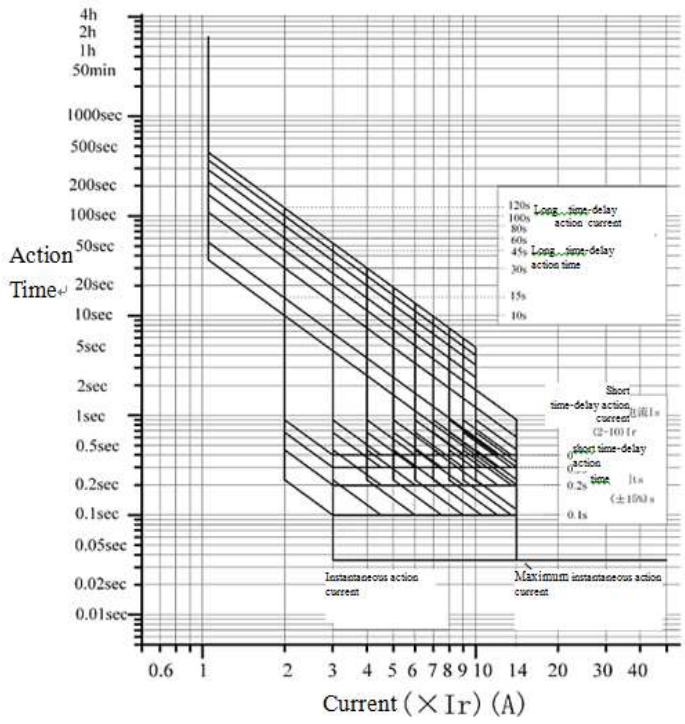


Fig.3 Tripping Plot

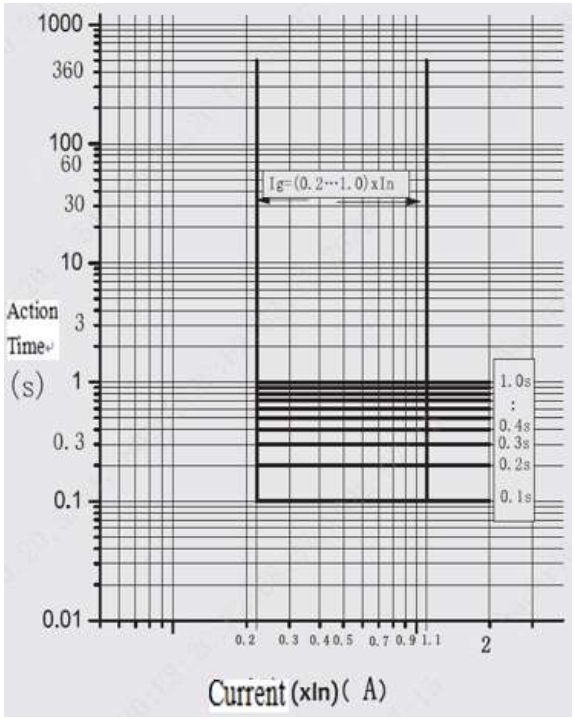


Fig.4 Ig Tripping Plot

6.2 Current limiting and permissive characteristic curve

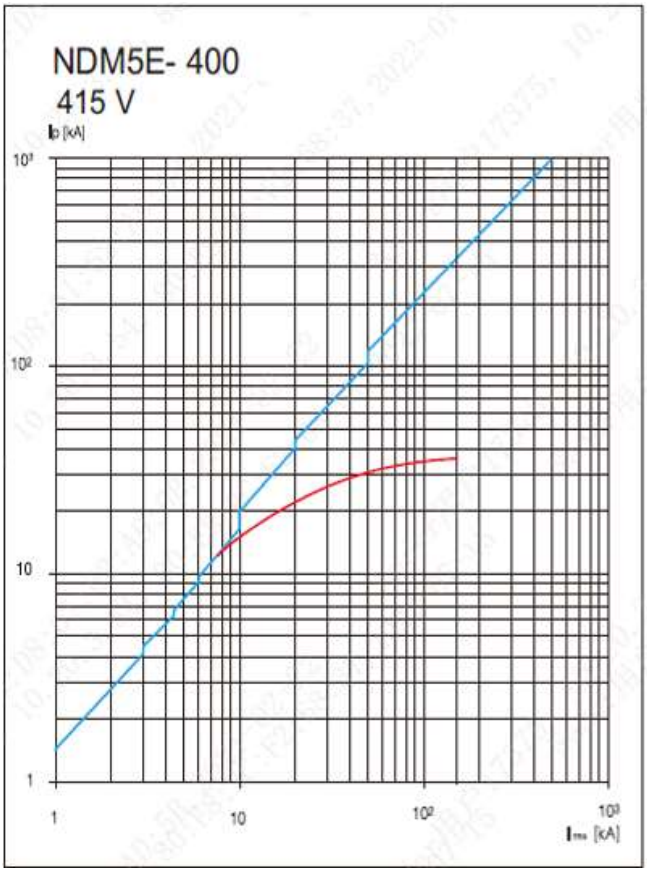


Fig.5 Current limiting characteristic curve chart

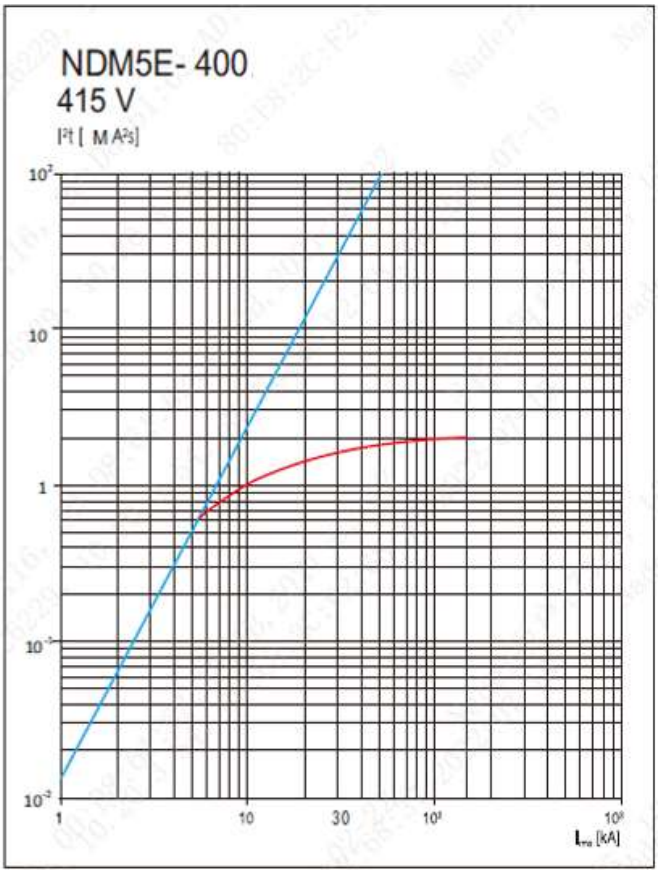
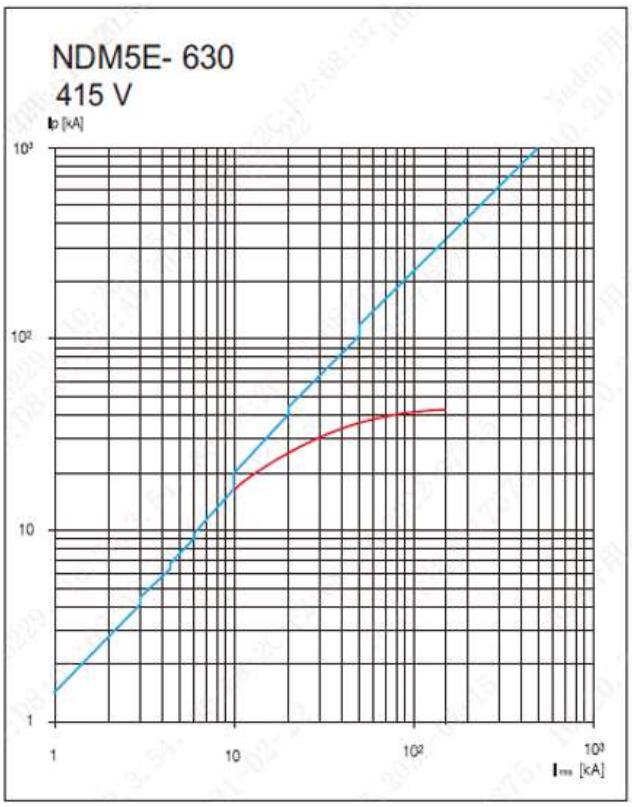


Fig.6 Permissive characteristic curve chart



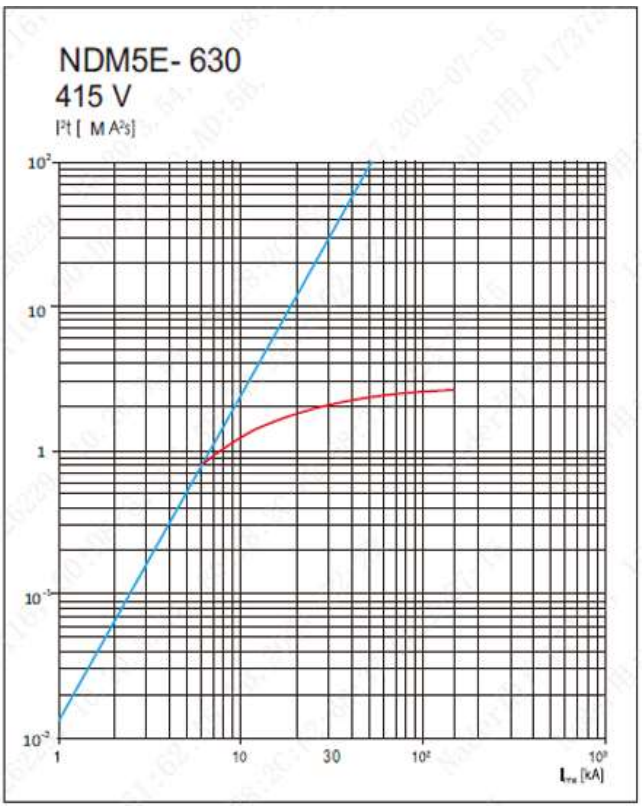
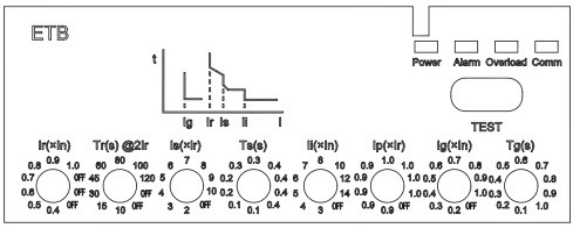


Fig.7 Current limiting characteristic curve chart Fig.8 Permissive characteristic curve chart

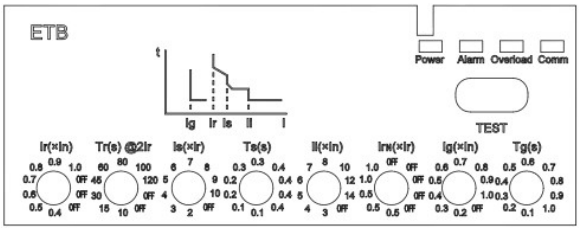
7、Controller operation description and function introduction

7.1 External dimensions of products

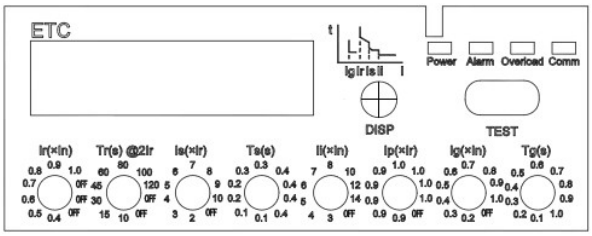
7.1.1 External dimensions of front-plate connection products



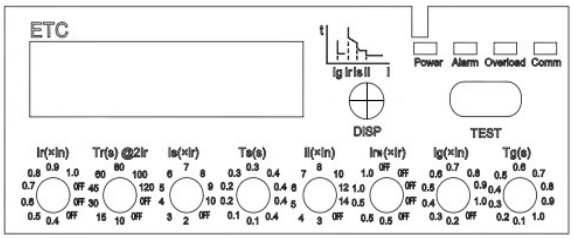
3P



4P



3P



4P

Fig .9 Gear for Intelligent Release

Components of Controller Panel

1. Ir Overload long delay current setting

2. Tr Overload long delay time setting

3. Is Short circuit short delay current setting

4. Ts Short circuit short delay time setting

5. Ii Short circuit instantaneous current setting

6. Ip Pre-alarm current setting

7. Ig GF current setting

8. Tg GF time setting

9. Irn N phase protection current setting

10. In rated current

11. DISP display in turns

12. TEST test port

13. Power power indicator

14. Alarm Pre-alarm indicator

15. Over Overload indicator

16. Comm Communication indicator

Note: Settings must be operated by professionals

7.1.2 Functions

(1) Test port

Special test equipment can be connected to via this port to test and adjust.

Meanwhile the port is also used to communication connection.

(2) Current and time knob

Rotating to set up the current and time. Good combination of these parameters can give protection to cable and device. This must be operated by professionals.

Tr indicates the time to trip under the condition that the actual current is 2 times of the setting value Ir. For products at a rated current of In=400A, when Ir is set to 1.0, Tr@2Ir to 10s and the main loop is powered on at the current of I=2×400A, the circuit breaker will break the main loop after lasting 10s with an accuracy of the action time ±10%.

At the overload current, the breaking time of the main loop performed by the circuit breaker depends on the formula below: t=(2×Ir/I)2×Tr@2Ir.

I indicates the actual current value in main circuit when overload.

(3) DISP button

Press to view the data and refresh the relative information in the screen.

7.1.3 Indicators

(1) Power indicates Power

Indicator is on when working

(2) Pre-alarm indicates Alarm

Indicator flashes when actual working current is over the set Ip and turns constant on after certain time.

(3) Overload indicates over

Indicator is on when actual working current is over 1.15 times of the set Ir. The breaker trips after certain time.

(4) Communication indicates Comm

Indicator is flashed when communicating

7.2 Setting of Controller Parameters

Table 10 Parameter Setting Gear Table of the 3P Electronic Controller

Rated current In (A)	Number of poles	Current and time parameters							
		Ir (×In)	Tr@2Ir (s)	Is (×Ir)	Ts (s)	Ig (×In)	Tg (s)	Ii (×In)	Ip (×Ir)
400 630	3	0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0, OFF	10, 15, 30, 45, 60, 80, 100, 120, OFF	2,3, 4 5, 6, 7 8, 9, 10 OFF	0.1 0.2 0.3 0.4	0.2, 0.3 0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0, OFF	0.1, 0.2 0.3, 0.4 0.5, 0.6 0.7, 0.8 0.9, 1.0	3, 4 5, 6 7, 8,9 10, 12 14,OFF	0.9 1.0 OFF

Table 11 Parameter Setting Gear Table of the 4P Electronic Controller

Rated current In (A)	Number of poles	Current and time parameters							
		Ir (×In)	Tr@2Ir (s)	Is (×Ir)	Ts (s)	Ig (×In)	Tg (s)	Ii (×In)	IrN (×Ir)
400 630	4	0.4, 0.5 0.6, 0.7 0.8, 0.9 1.0, OFF	10, 15, 30, 45, 60, 80, 100, 120, OFF	2, 3, 4 5, 6, 7 8, 9, 10 OFF	0.1 0.2 0.3 0.4	0.2, 0.3 0.4, 0.5 0.6, 0.7 0.8, 0.9 OFF	0.1, 0.2 0.3, 0.4 0.5, 0.6 0.7, 0.8 0.9, 1.0	3, 4 5, 6 7, 8,9 10, 12 14, OFF	0.5 1.0 OFF

Note: For 4P products, Ip=0.9Ir

For ETB-T/ETB-PT/ETC-T/ETC-P/ETC-PT products, the P and T in release derived code are displayed in side label of the products.

7.3 Detail Demonstration of Controller Function

7.3.1 Basic function table

Table 12 Comparison Table for Basic Function

Release code		ETB	ETC	ETB-T	ETC-T	ETB-PT	ETC-P	ETC-PT
Protection alarm	Long-delay protection	√	√	√	√	√	√	√
	Short-delay protection	√	√	√	√	√	√	√
	Instant protection for short circuit	√	√	√	√	√	√	√
	Neutral pole protection(4C/4D)	√	√	√	√	√	√	√
	Ground protection	√	√	√	√	√	√	√
	Over/under voltage protection	—	—	—	—	√	√note1	√

	Pre-alarm for overload		√	√	√	√	√	√	√
	Heat simulation(heat memory)		√	√	√	√	√	√	√
Measurement	Current measurement		—	√	√	√	√	√	√
	Voltage	Line/phase voltage	—	—	—	—	√	√	√
	Power	Active Reactive Apparent PF	—	—	—	—	√	√	√
	Energy	Active Reactive Apparent	—	—	—	—	√	√	√
	Frequency		—	—	—	—	√	√	√
Maintenance	Setting	Knob	√	√	√	√	√	√	√
		Menu	—	—	—	—	—	—	—
	Storage for Fault memory	Overload, short-delay for short circuit, instant for short circuit, action time, fault phase	1 note2	1	20	20	20	1	20
		Over/under voltage, action time, fault phase	—	—	—	—			
	Operation time with electricity		—	—	√	√	√	—	√
	Contact wearing		—	—	√	√	√	—	√
	Storage for log		—	1	20	20	20	1	20
Display	Real-time current		—	√	√	√	√	√	√
	Real-time voltage		—	—	—	—	√	√	√
	Power, energy, frequency		—	—	—	—	√	√	√
	Setting value		—	—	—	—	√	√	√
	Last fault type, fault current and voltage, action time length, occurrence time		—	√	√note3	√	√note3	√	√
Extended module	Diplay module note4		○	○	○	○	○	○	○
	Temperature testing module note4		○	○	○	○	○	○	○

Note 1：ETC-P the value for under/over voltage is fixed, can't be changed

Note 2：communication adaptor DF-MB/C3 or display module DF-XS1 need to be deployed；

Note 3：displayed by the upper system

Note 4：○ means optional function

7.3.2 Setting value for controller

(1) Setting value of the overload long time-delay protection:

The overload long time-delay protection is based on the true RMS value for protecting the load.

Table 13 Overload Long-Delay Protection Parameter Setting

Setting gear of the current Ir		(0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0,OFF) ×In tolerence±3%							
Action characteristics	Tr@2Ir setting gear (s)	10	15	30	45	60	80	100	120
	≤1.05Ir	＞2h (no action)							
	＞1.30Ir	＜1h (action)							
	At 1.5Ir, tr (s)	17.77	26.67	53.33	79.99	106.67	142.22	177.77	213.33
	At 2.0Ir, tr (s)	10	15	30	45	60	80	100	120
	At 7.2Ir, tr (s)	0.77	1.16	2.31	3.47	4.63	6.17	7.72	9.26
	Accuracy (%)	±10							

Note: The action curve complies with Tr=(2Ir)2×Tr@2Ir /I2

Tr: overload long time-delay action time Tr@2Ir: setting value of the overload long time-delay action time

I: Actual running current Ir: setting value of the overload long time-delay action current

When Tr is off, MCCB will not trip if overloaded.

(2) Setting value of the short-circuit short time-delay protection:

The short time-delay protection prevents the impedance short-circuit of the distribution system. Divided into two segments: reverse time limit and fixed time limit.

Table 14 Short Circuit Short Delay Protection Parameter Setting

Setting gear of the current Is		(2, 3, 4, 5, 6, 7, 8, 9, 10,OFF)×Ir				
Action characteristics	Reverse time limit Is≤I＜1.5Is	Ts setting gear (s)	0.1	0.2	0.3	0.4
		ts action time (s)	$t_s=(1.5Is)^2×Ts/I^2$			
	Fixed time limit 1.5Is≤I＜Ii	ts action time (s)	0.1	0.2	0.3	0.4
		Accuracy (%)	±10			
	I＜0.9 Is	no action				

Note: The action curve of the reverse time limit complies with $ts=(1.5Is/Is)^2×Ts$, while the action time of the fixed time limit tracks the Ts setting value.

ts: short-circuit short time-delay action time

Ts: setting value of the short-circuit short time-delay action time

I: Actual running current

Is: setting value of the short-circuit short time-delay action current

There is an additional fixed error 20ms except from the time accuracy in table above.

When Ir is ture off Is will turn off synchronously.

(3) Setting Value of the Short-Circuit Instant Protection:

The instantaneous protection function can prevent short circuit of metal solids of the distribution system. Due to larger short-circuit current of the fault, the system requires being disconnected rapidly.

Table 15 Short-Circuit Instant Protection Parameter Setting

Action characteristic	setting current gear Ii(×In)	3	4	5	6	7	8	10	12	14
	current accuracy(%)	±15								
	I≥1.15Ii action time	＜50ms								
	I≤0.85Ii	no action								

(4) Setting value of the ground fault:

Ground fault protection function prevents the distribution system from metallic solid grounding short circuit. The time-delay for this protection is fixed.

Table 16 Ground Fault Protection Parameter Setting

Setting gear of the current Ig			(0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0,OFF) ×In tolerance ±10%							
Action characteristics	Fixed time limit I△≥1.1Ig	Tg setting gear (s)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		t action time (s)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
		Action time accuracy (%)	±10									
	I△≤0.9Ig		no action									
Note: I△ is the three-phase current vector sum of the circuit breaker or the vector sum of three phases plus N-phase current.												

Note: I△ is the vector sum of three-phase current or three-phase plus N-phase current of the circuit breaker.

In addition to the accuracy of action time allowed in the above table,the inherent error ±20ms shall also be considered.

(5) Setting value of the N-phase protection:

The 4-pole controller features the N-phase overload long time-delay protection.

Table17 N-Phase Protection Setting Value

N-phase protection type	Description
0.5Ir	The protective action point is half of the setting value in case of a N-phase overload fault
1.0Ir	The protective action point equals to the setting value in case of a N-phase overload fault
OFF	N-phase protection turned off

Note: The N-phase overload long time-delay protection time tracks the Tr setting value.

(6) Setting value of the overload pre-alarm:

Table 18 Controller with Pre-Alarm Function

Setting current Ip		see table 7-1	Accuracy （%）	Note
Action characteristics	＜ 0.9 IP	pre-alarm indicator light change from twinkling to keeping on	±3	No gear setting for 4-pole controller. Fixed 0.9 Ir
	＞1.1 IP	pre-alarm indicator light change from twinkling to keeping on		
	OFF	OFF	OFF	
Function Description		when I ≥ IP, the warning indicator (yellow light) flashes. After t = t / 2, the indicator turns to be on continuously		

(7) Measurement accuracy

Table 19 Measurement Accuracy Parameter

		Measurement range	Accuracy
Current	Ia, Ib, Ic, In	（0.2～2）In	±1%;
Voltage	Line voltage	（0.5～1.5）Ue	±0.5%
	Phase volatge	（0.5～1.5）Ue/1.732	±0.5%
Power	Active power	（0.2～2）In, （0.5～1.5）Ue	±1%
	Reactive power		
	Apparent power		
	Power function	-0.5～-1，0.5～1；	±1 %
Energy	Active energy	（0.2～2）In, （0.5～1.5）Ue	±1%
	Reactive energy		
	Apparent energy		
Frequency		/	±0.1Hz

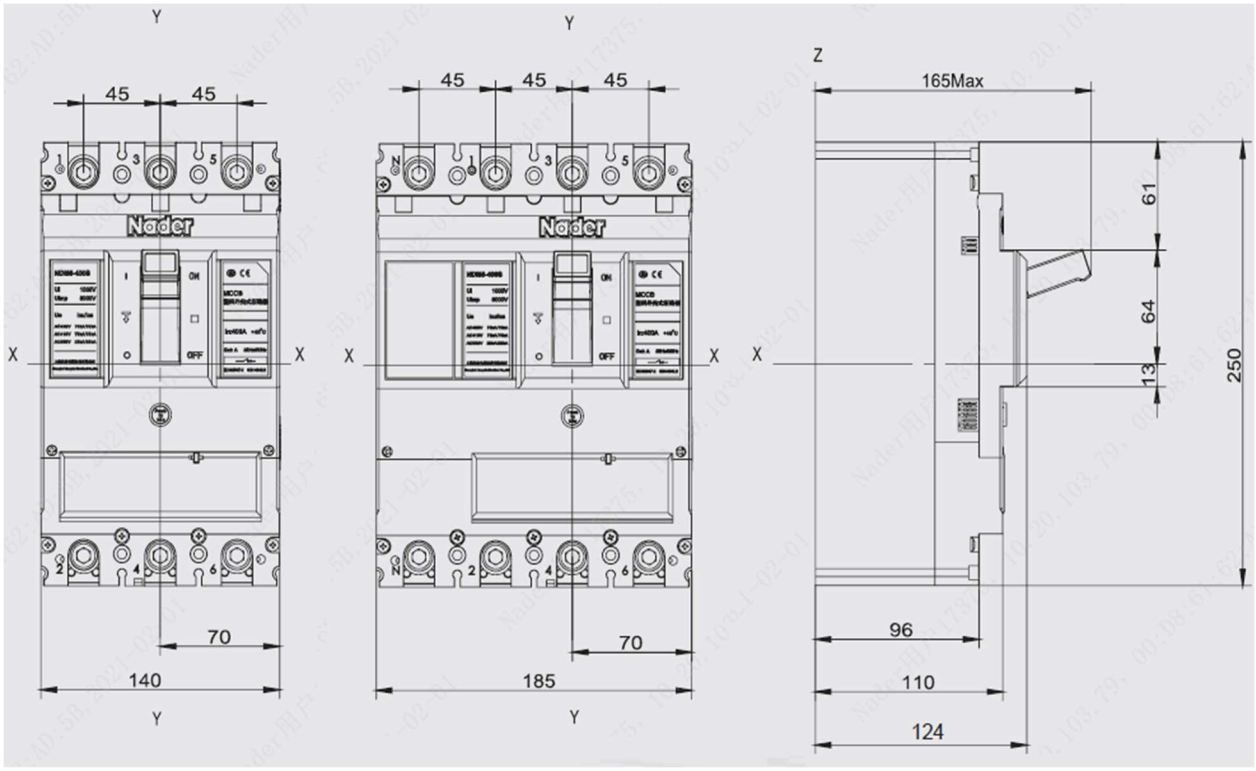
7.3.4 Health management

The indication of circuit breaker health is expressed by 0 to 100%，and the superposition management id carried out form the three dimensions of production date, operation tmes and contact wear。

Note: It can only be read through communication.

8. Outline and installation dimensions

8.1 External Dimensions of Front-Panel Connection Products



3P 4P

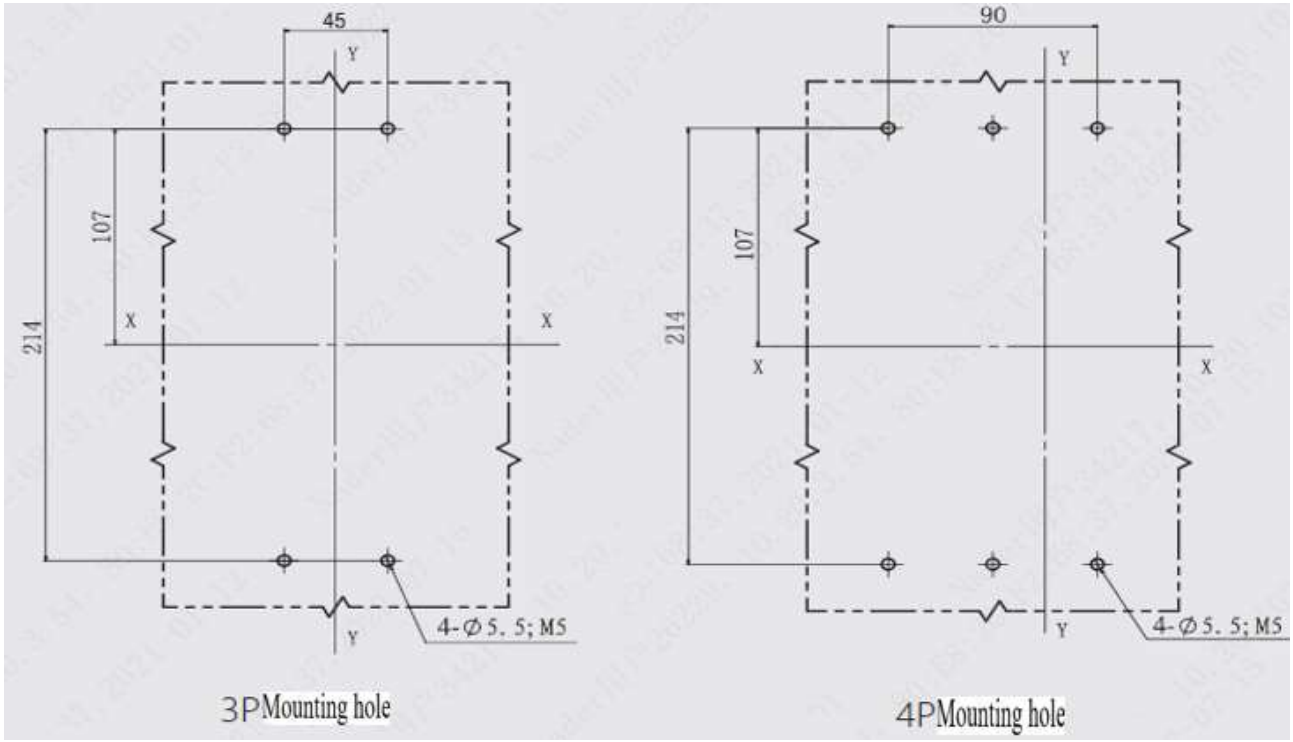


Fig.10 NDM5E-400/630 External Dimensions Of Front-Panel Connection Products

Note:1) Unmarked tolerance level should follow GB/T 1804-c.

2) Four mouning hols for grade 4 products can be selected from the size

8.2 NDM5E-400/630 External Dimensions of Extended Front-Panel Connection Products

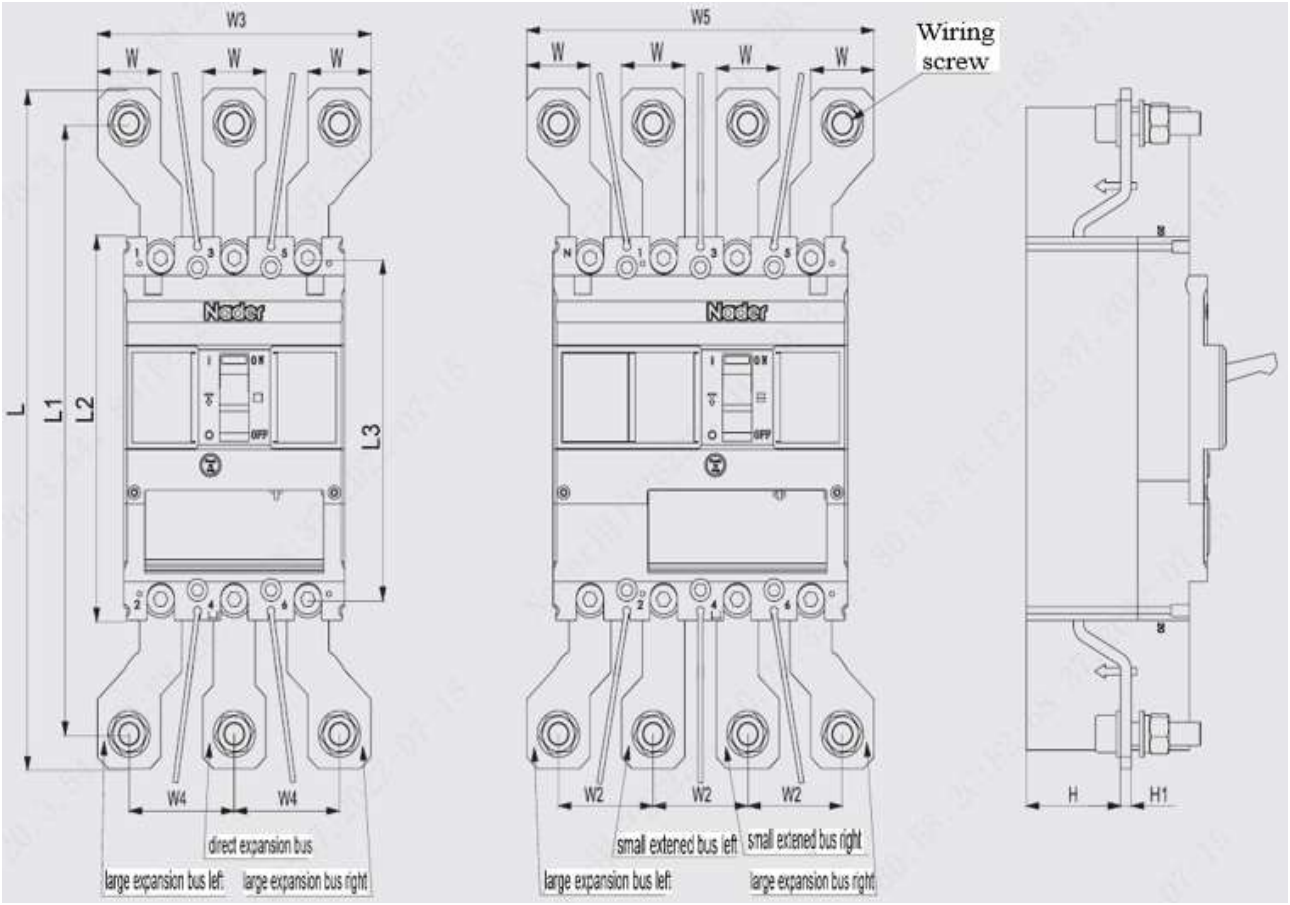


Fig 11 Outline and installation dimensions of expansion wiring in front of the board

Table20 Boundary dimensions of extended wiring products in front of the board（unit: mm）

Extended bus	Modle	L	L1	L2	L3	W	W2	W3	W4	W5	H	H1	Wiring screw
KM1/M5-400	NDM5E-400	376	336	250	216	40	55	160	60	205	42	6	M12x50
KM1/M5-630	NDM5E-630										40	10	M12x50

Note 1：3p Extended bus combination mode：large expansion bus（2 pieces on the left、 right）+2 –piece direct expansion busbar；

2：4p Extended bus combination mode：small expansion bus（2 pieces on the left、 right）large expansion bus（2 pieces on the left、 right）；

3: Unmarked tolerance level should follow GB/T 1804-c.

8.3 NDM5E-400/630 3P、4P Overall dimensions and installation dimensions of wiring products behind the board

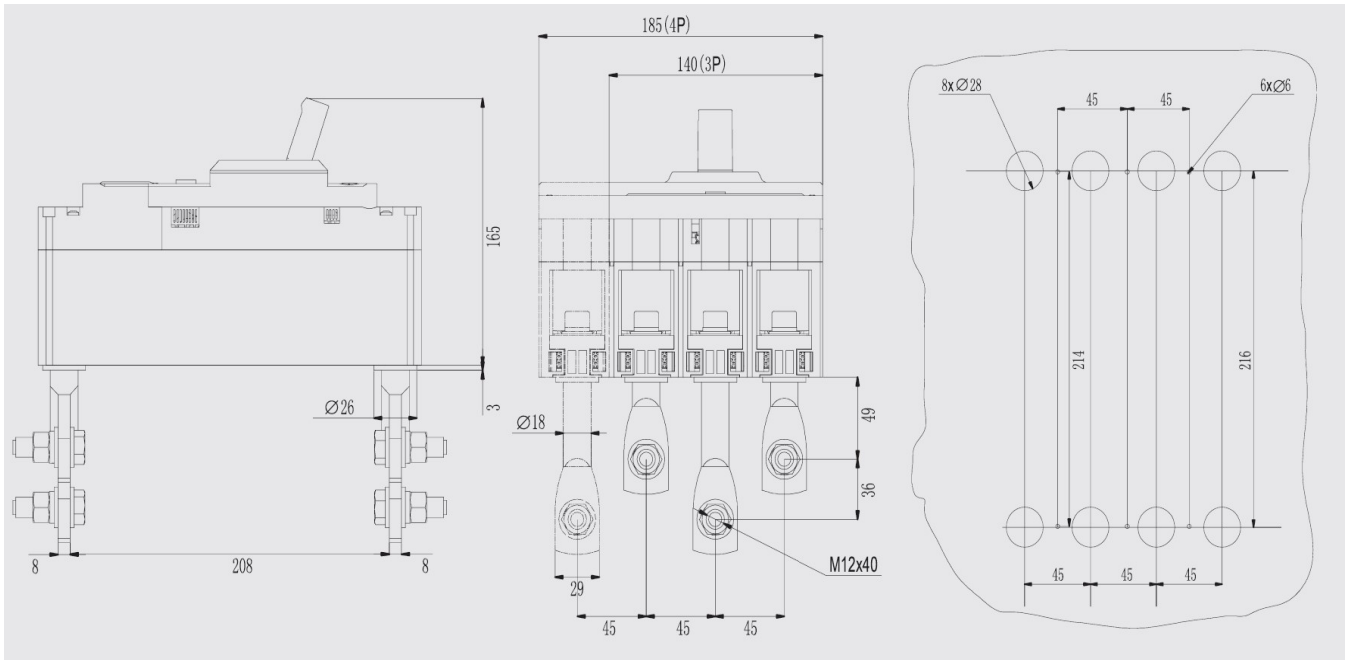


Fig 12 3P、4P Outline overall dimensions and installation dimensions of wiring products behind the board

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.4 NDM5E-400/630 3P、4P Outline dimensions of plug-in front board wiring products

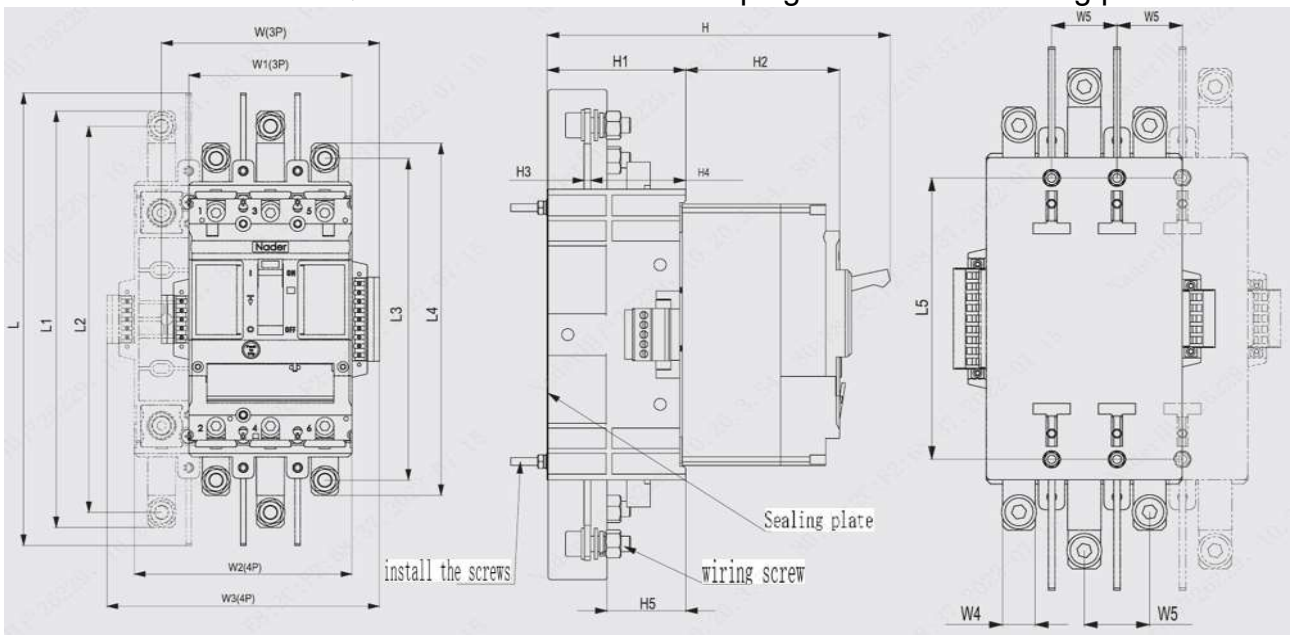


Fig 13 3P、4P Outline dimensions of plug-in front board wiring products

Table 21 Outline dimensions of plug-in front board wiring products（unit: mm）

Plug in specification	Modle	W	W1	W2	W3	W4	W5	L	L1	L2	Wiring screw
CR1-Q/M5-630	NDM5E-400/630	166	140	185	211	30	45	398	330	302	M10×40
		L3	L4	L5	H	H1	H2	H3	H4	H5	Install the screws
		/	/	240	267	104	107	8	66	50	M5×90

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.5 NDM5E-400/630 3P、4P Outline and installation dimensions of plug-in front board rear wiring products

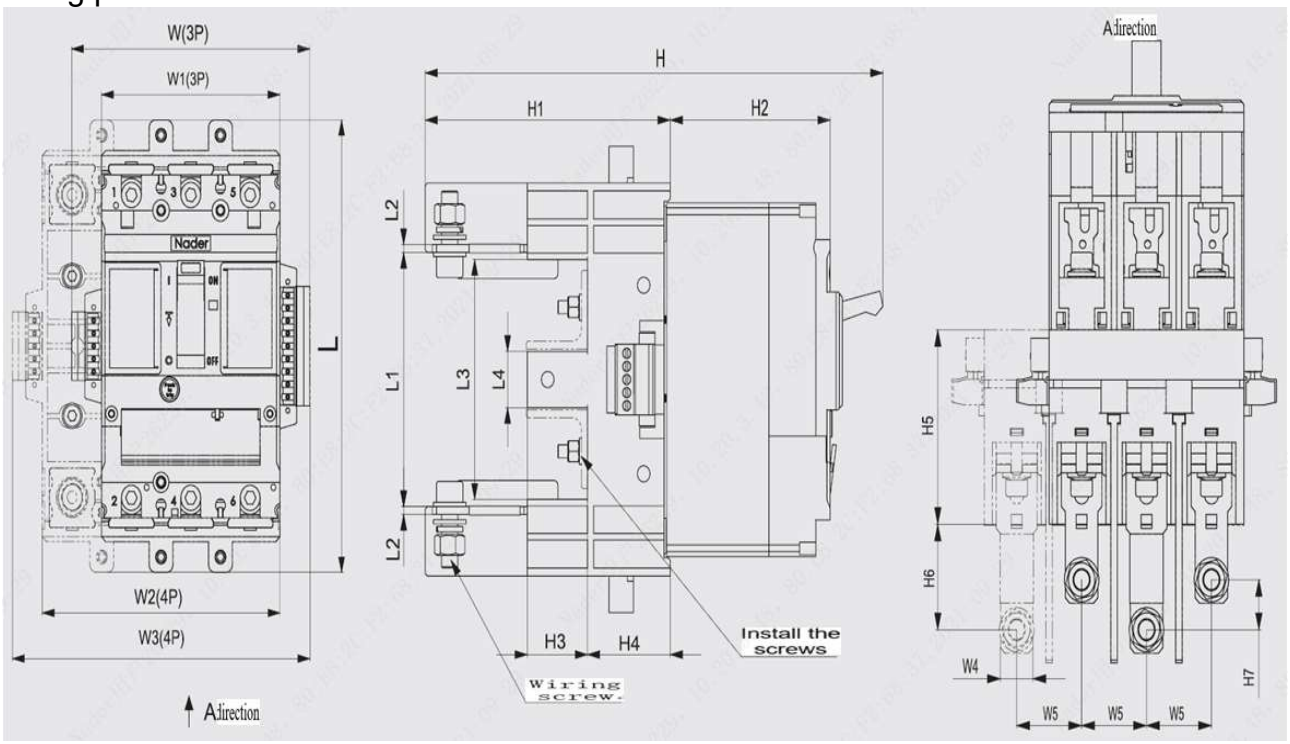


Fig 14 3P、4P Outline dimensions of plug-in board rear wiring products

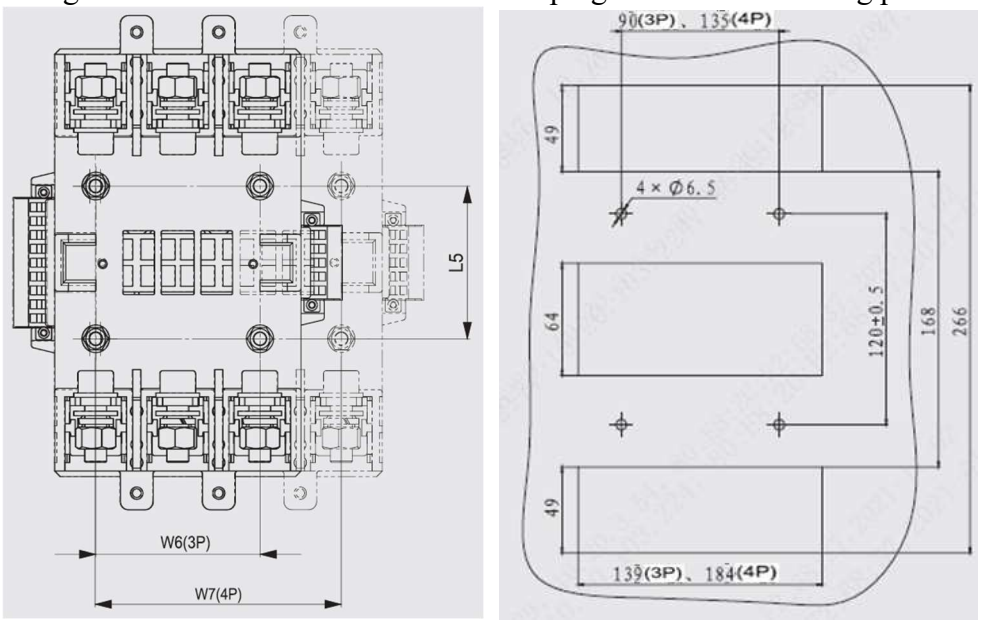


Fig 15 Opening dimension drawing of safety rotating plate of plug-in sok=cket and installation dimension drawing of wiring products behind the plate

Table 22 Outline dimensions of plug-in board rear wiring products（unit: mm）

Plug in board rear wiring	W	W1	W2	W3	W4	W5	W6	W7	L	L1	L2	Wiring screw
CR1-H/M5-630	166	140	185	211	30	45	90	135	291	182	8	M10×40
	L3	L4	L5	H	H1	H2	H3	H4	H5	H6	H7	Install the screws
	172	60	120	311	148	108	52	52	102	23	0	M6×40

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.6 NDM5E-400/630 3P、4P outline dimensions of withdrawable font panel wiring products

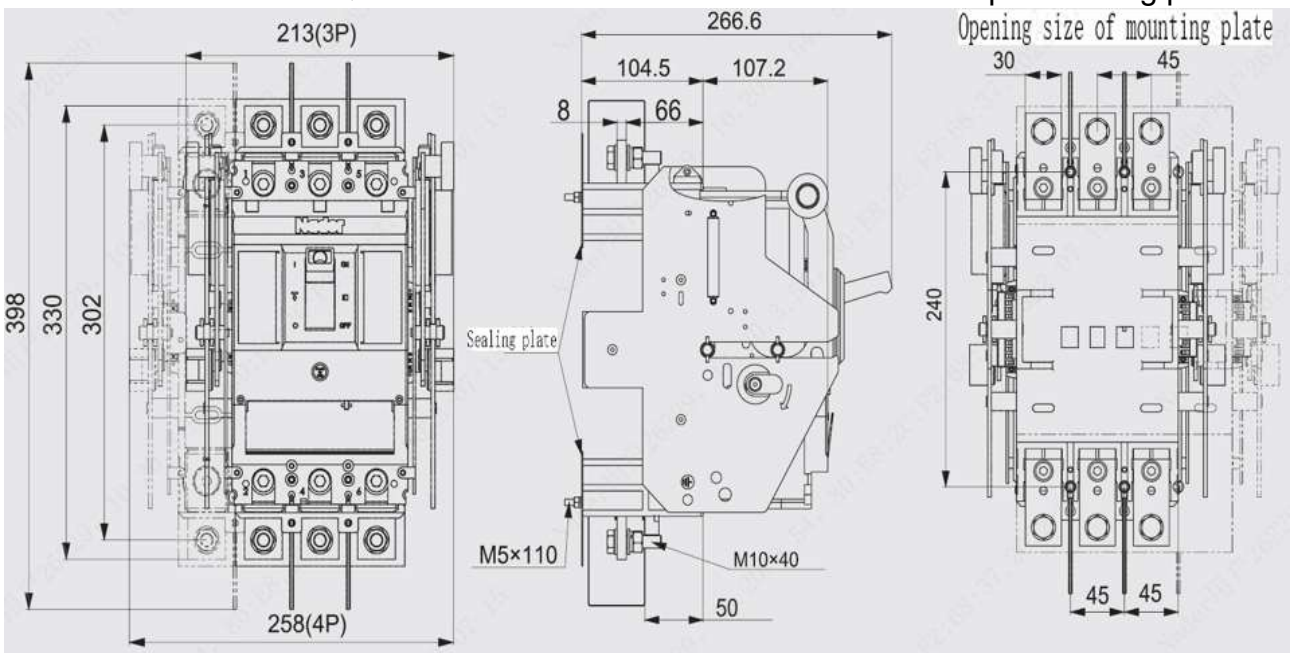


Fig 16 3P、4P outline dimensions of withdrawable font panel wiring products

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.7 NDM5E-400/630 3P/4P Outline dimensions of withdrawable board rear wiring products

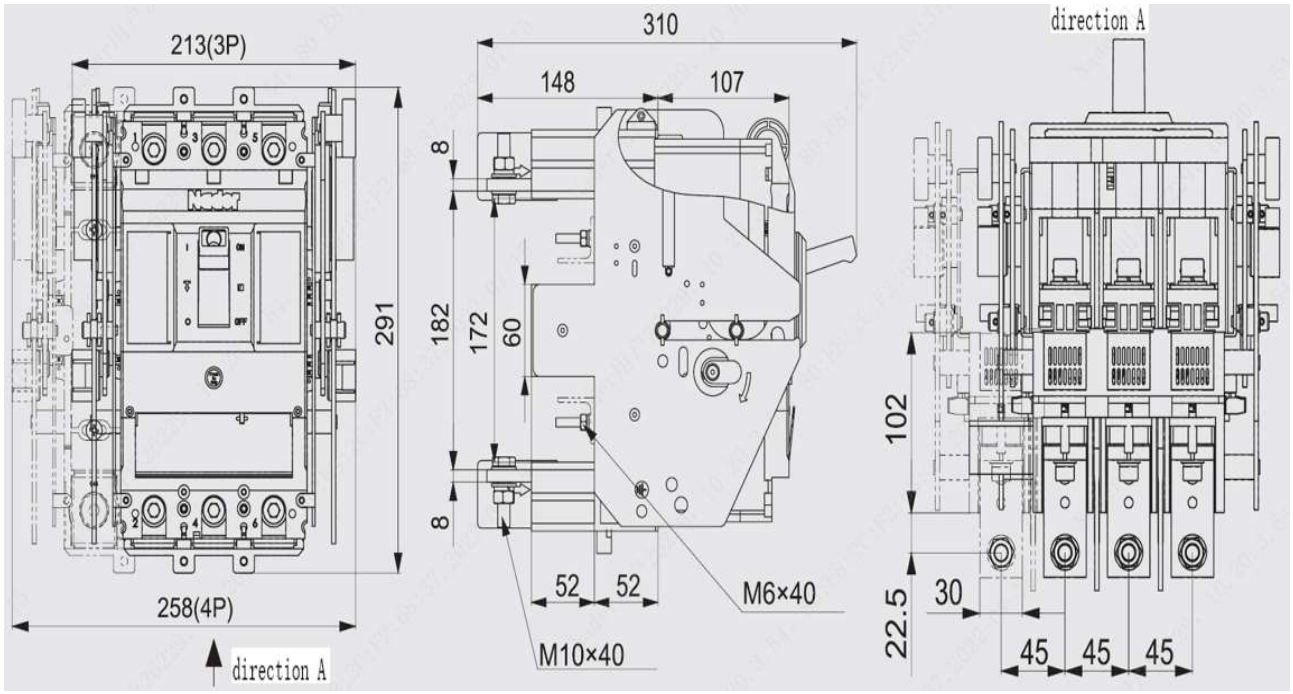


Fig17 3P/4P Outline dimensions of withdrawable board rear wiring products

Note: Unmarked tolerance level should follow GB/T 1804-c.

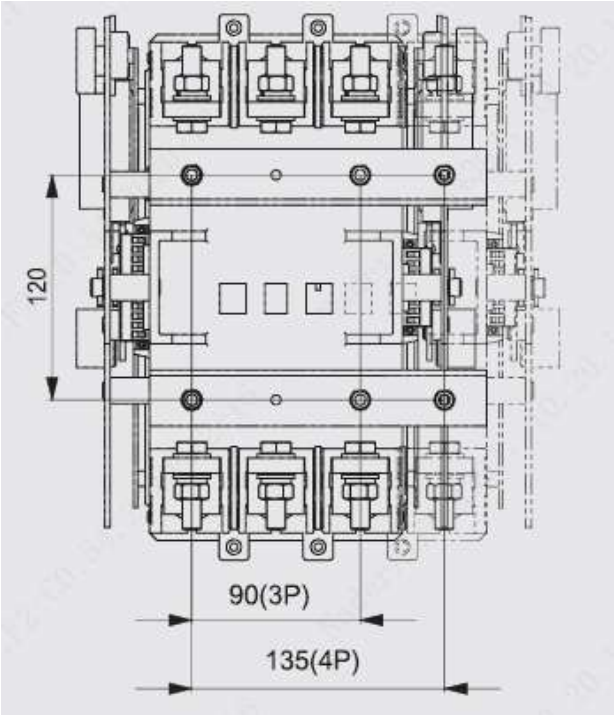


Fig 18 Drawing of hole size of mounting plate of withdrawable rear socket

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.8 Rotary handle operating mechanism

Manual operation-the schematic diagram of handle installation and opening and the outline dimension diagram of manual operation are shown below respectively：

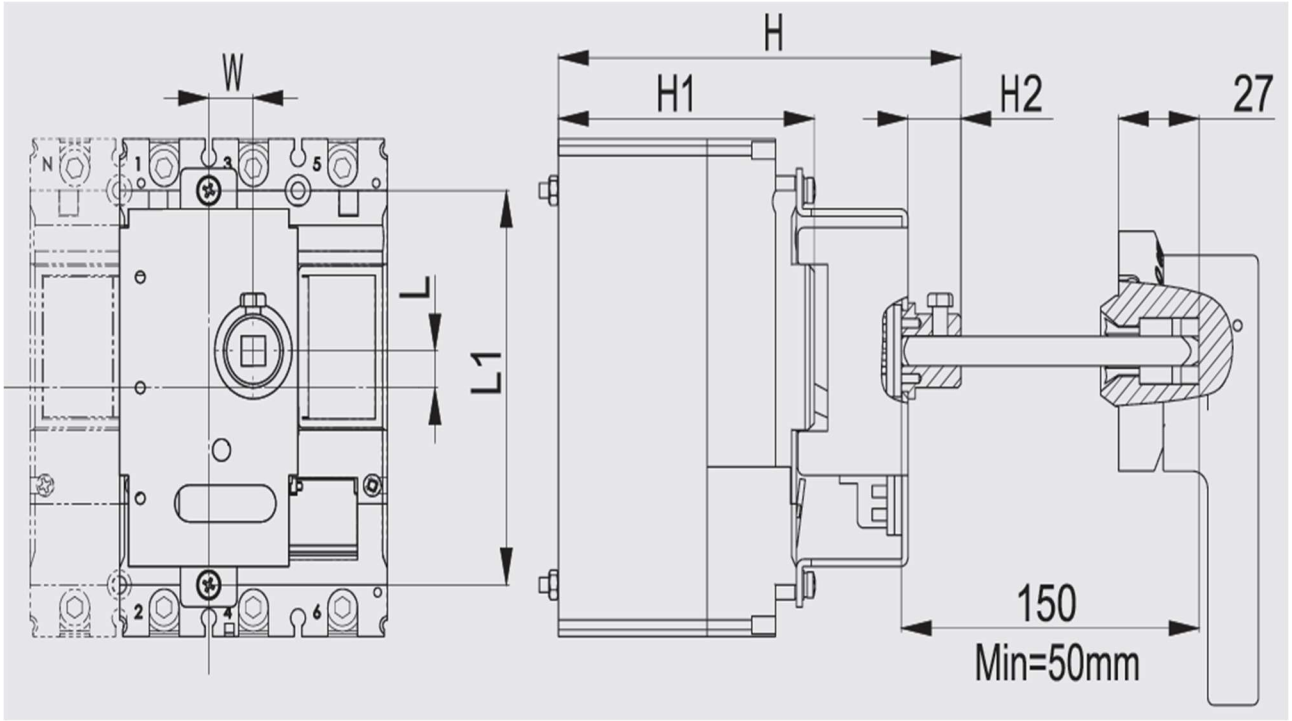


Fig.19 Installation drawing of rotary handle operating mechanism

Table 23 Installation drawing of rotary handle operating mechanism（unit: mm）

Manual operating mechanism	Model	W	L	L1	H	H1	H2	Square shaft specification
SC1-Y/M5-630	NDM5E-400/630	22. 5	19	214	203	118	20	10×10

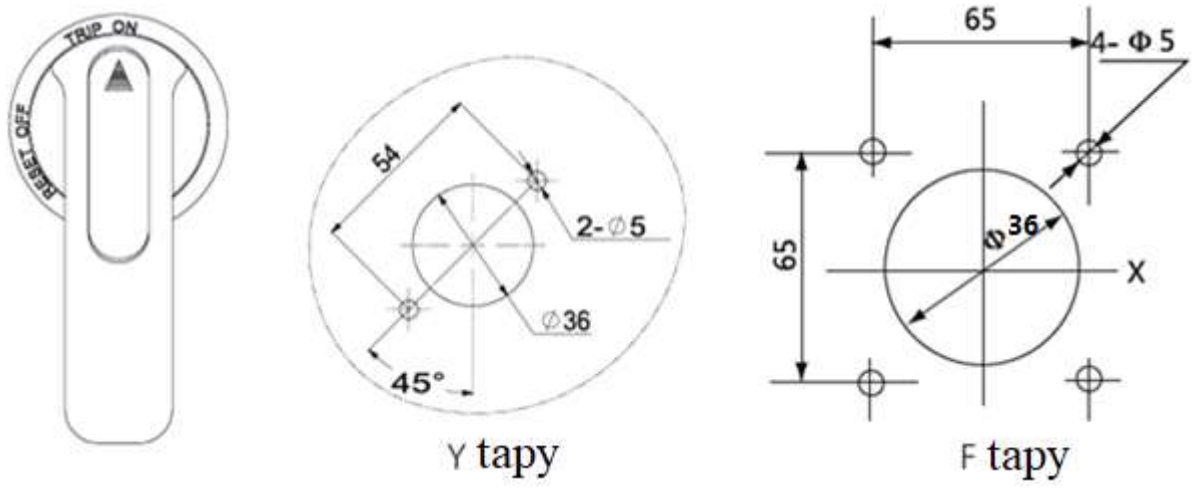


Fig.20 Installation opening diagram of rotary handle

Note:1)During manual operation, it shall rotate 180° clockwise，and counterclockwise operation is prohibited.

2） Unmarked tolerance level should follow GB/T 1804-c.

8.9 Electric operation

Electric operation-overall dimension of circuit breaker and its electric operating mechanism after installation：

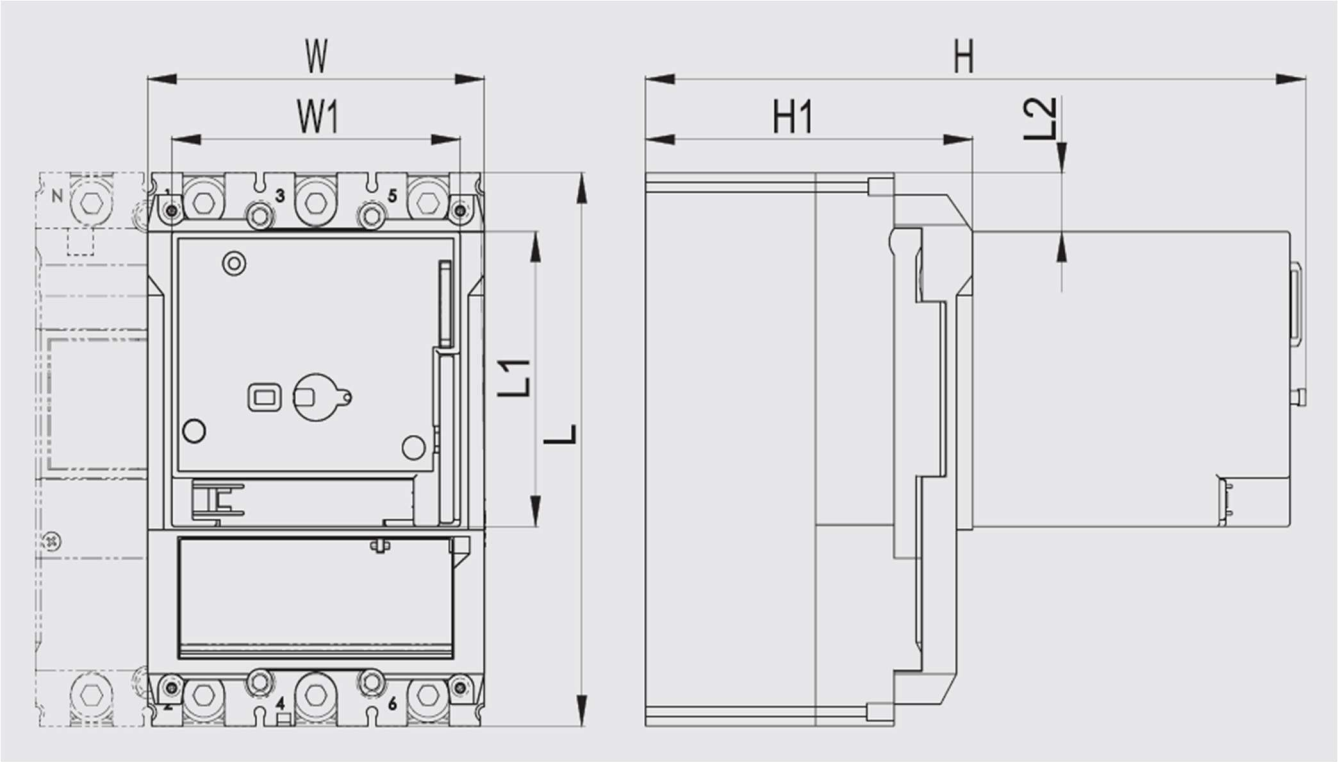


Fig.21 External dimension diagram of electric operation

Table24 External dimension diagram of electric operation（unit: mm）

Electric operation model	Modle	W	W1	L	L1	L2	H	H1
DC1-□/M5-630	NDM5E-400/630	140	130	250	140	30	265	124

Note：： Unmarked tolerance level should follow GB/T 1804-c.

Table 25 Voltage specification and power of electric operation

Attachment Name	Electric operation			
Voltage specification	DC24V	AC110V/DC110V	AC230V/DC220V	AC400V
power (W)	160	300	300	300

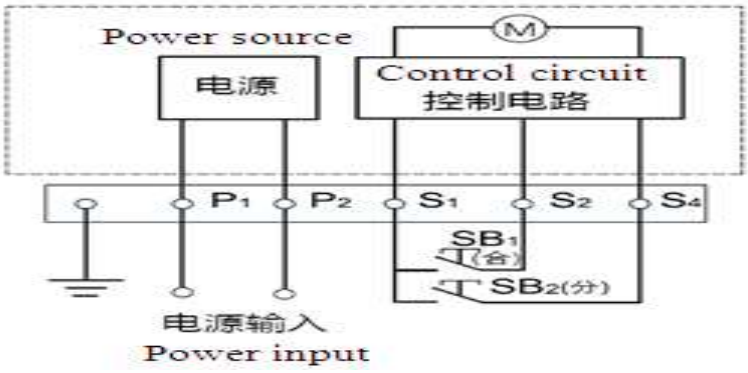


Fig.22 Electric operation wiring diagram

Note：1）During manual operation,180° shall be operated clockwise ,and counterclockwise operation is prohibited

2） P1 and P2 shall not be connected with S1 and S2 and S4 during electric operation wiring

3） Unmarked tolerance level should follow GB/T 1804-c.

4)□Indicates the voltage specification。

8.10 Copper bar in front of board or copper cable with wiring terminal

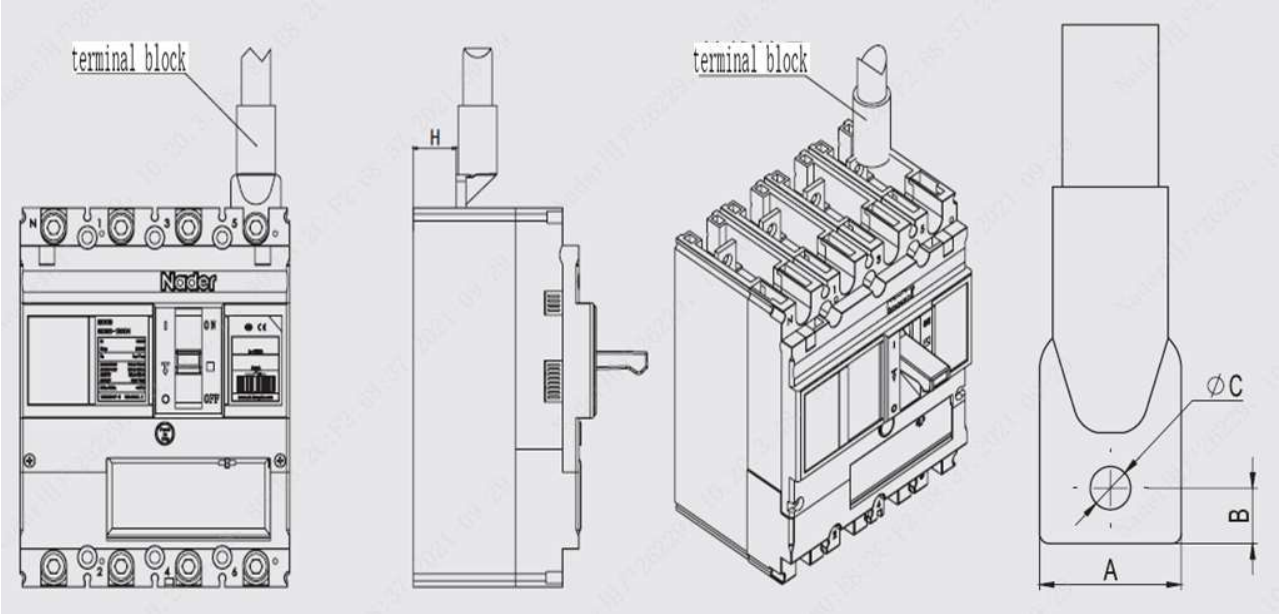


Fig.23 Connection diagram of copper bar in front of board or copper cable with wiring terminal

Table 26 Connection size of copper bar in front of board or copper cable with wiring terminal

Modle	A(mm)	B(mm)	ΦC(mm)	H(mm)
NDM5E-400	≤36	≤14	11	26
NDM5E-630	≤36	≤14	11	28

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.11 Safety distance

The minimum safety distance between the top, bottom, side and front panel when installing the circuit breaker, see the figure below：

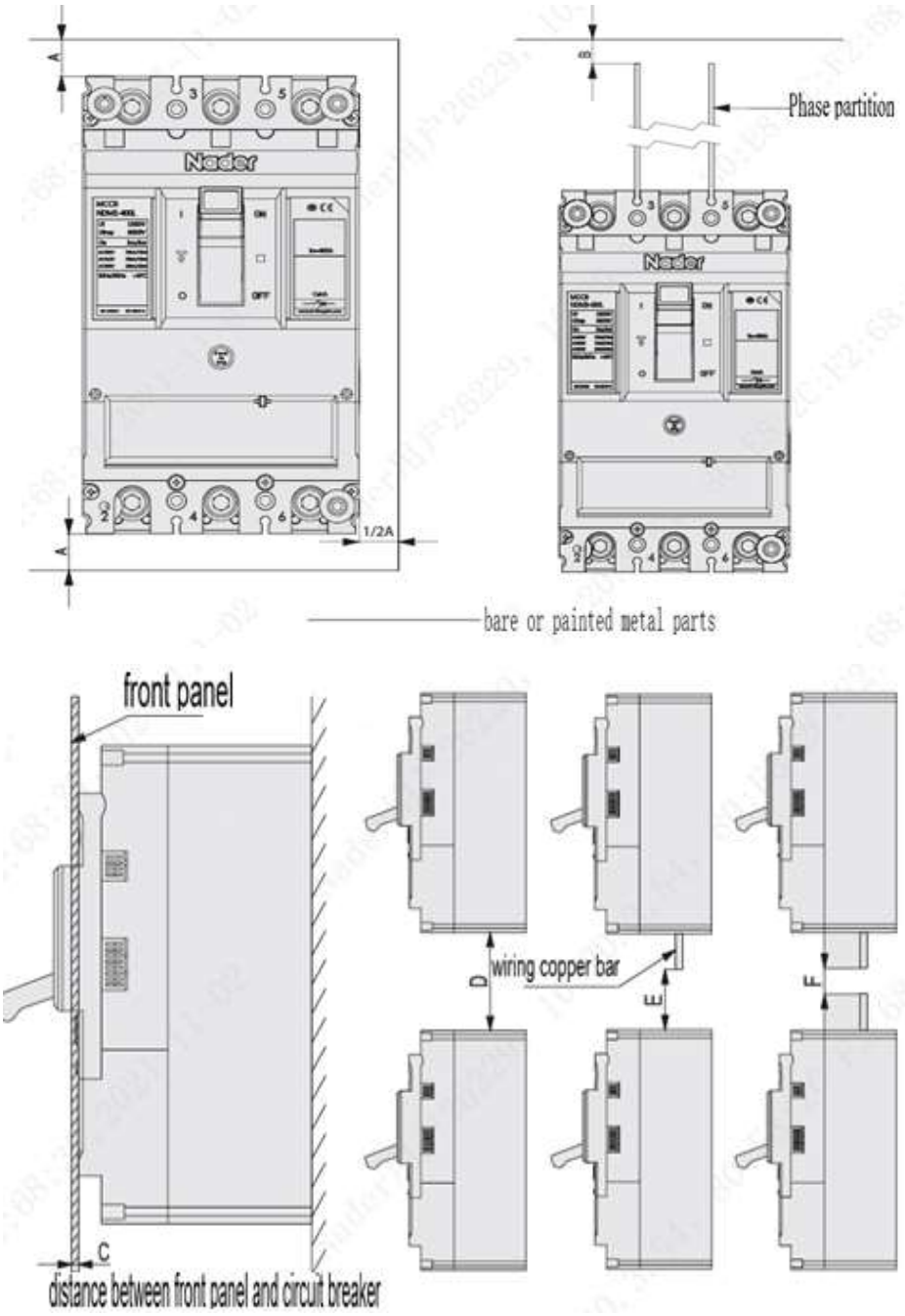


Fig.24 Insulation distance mounted in the metal cabinet

Table 27 Insulation distance mounted in the metal cabinet (unit: mm)

Model	Spacing A	Spacing B	Spacing C	Spacing D	Spacing E	Spacing F
NDM5E-400/630	≥100	≥0	≥0	≥160	≥120	≥80

Note: Unmarked tolerance level should follow GB/T 1804-c.

8.12 Wiring diagrams of the product main circuit

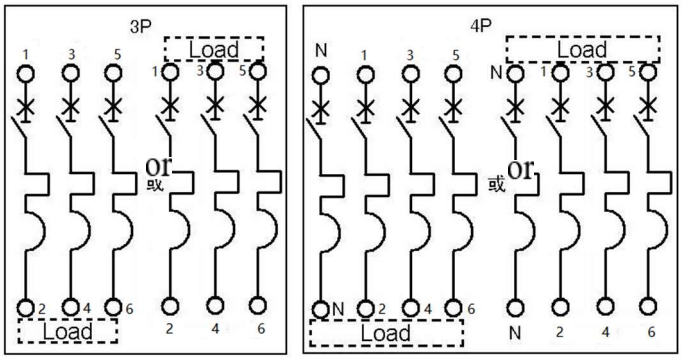


Fig.25 Main circuit wiring mode of AC products

9、Attachment function description

9.1 Under-voltage Release

When the power voltage drops to the range (35%~70%) of the under-voltage release, the release can break the circuit breaker reliably; when the power voltage is 35% lower than the rated working voltage of the under-voltage release, the release can prevent closing of the circuit breaker; when the power voltage is 85% higher than the rated working voltage of the under-voltage release, the release can guarantee reliable closing of the circuit breaker.

Table 28 Rated Parameters of the Under-voltage Release

Product specifications	under-voltage release			Tightening torque value of wiring screw
Voltage specifications (V)	AC110/DC110	AC230/DC250	AC400	
Holding Power consumption (W)	0.5	1.0	2.2	
Code	Q11	Q22	Q40	1.2N.m

Fig.26 Working Diagram of Under-voltage Release

9.2 Shunt release

When the external voltage of the shunt release is between 70% and 110% of the rated control power voltage, the release can break the circuit breaker reliably.

Table 29 Rated Parameters of the Shunt Release

Product specifications	Shunt release				Tightening torque value of wiring screw
Voltage specifications (V)	AC/DC24	AC/DC48	AC/DC110	AC230/DC250	
Power consumption(W)	20	9.5	8	20	1.2N.m
Code name	FT02	FT04	FT11	FT22	

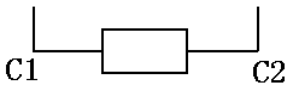


Fig.27 Working Diagram of Shunt Release

Note：shunt tripper is working principle：it is a single pulse action。If it needs to act again, the shunt release must be power on before it can act again.

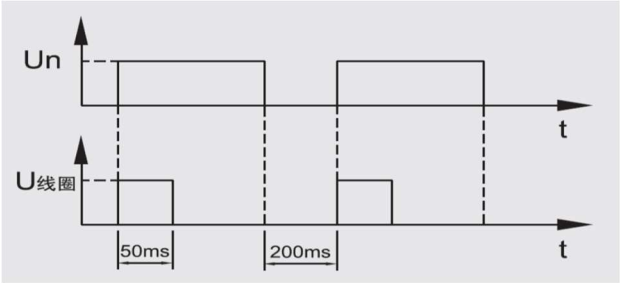
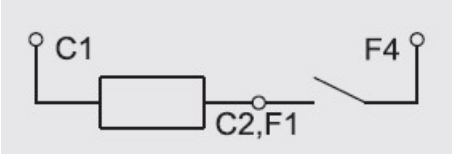


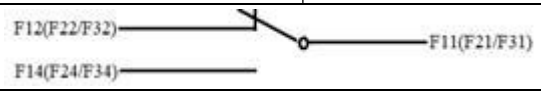
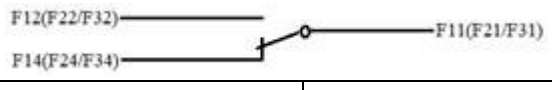
Fig.28 Working principle diagram of shunt tripper

If long-term power supply is required so that the circuit breaker cannot be closed normally, one auxiliary contact can be connected in series as shown in the figure below.



9.3 Rated parameters of the auxiliary contact

Table 30 Rated parameters of the auxiliary contact

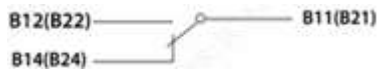
Accessory name		Auxiliary contact(conventional)	Auxiliary contact(low power consumption)
Voltage specifications (V)/conventional (Ith)		AC250V/10A、AC400V/3A、DC220V/0.2A	DC30V/0.1A
Wiring diagram	On, off		
	Free tripping		
Internal resistance		＜30mΩ	＜50mΩ

Note：If need DC30V/0.1A Auxiliary contact，please explain when ordering。

2): The first auxiliary harness is identified as F11 (red), F12 (white), F14(yellow), and the second auxiliary harness is identified as F21 (red), F22(white), F24 (yellow), and so on. At most three groups of auxiliary harness are installed.

9.4 Rated parameters of the alarm contact

Table 31 Rated parameters of the alarm contact

Accessory name		Alarm contact(conventional)	Alarm contact(low power consumption)
Voltage specifications (V)/conventional (Ith)		AC250V/10A、AC400V/3A、DC220V/0.2A	DC30V/0.1A
Wiring diagram	On, off		
	Free tripping		
Internal resistance		＜30mΩ	＜50mΩ

Note：If need DC30V/0.1A Auxiliary contact，please explain when ordering。

2)The first alarm harness is identified as B11 (red), B12 (white), B14 (yellow), andthe second auxiliary harness is identified as B21 (red), B22 (white), B24(yellow), and so on. At most two groups of alarms are installed.

Under-voltage release、Shunt Release、Auxiliary contact、Alarm contact ，the standard wiring line is 0.7m long , 1m、2m、4m can be customized according to requirements。

9.5 Communication Adaptor DF-MB/C3

Installing by DIN35 standard slide rail, the dimension of single product is shown as below. If there is a T in the MCCB release code, this unit is contained NDT2570020。

The main parameters are as follows：

Table 32 Main Parameter of Communication Adaptor

Communication adaptor common parameter		
Electrical characteristic	Power supply	24V DC(19.2～28.8VDC)
	Power dissipation	40mA
Communication	Port	RS485，2 Modbus RTU
	Optional address	1～99
	Baud rate	2400/4800/9600/19200bps
	Check bit	CRC check odd-even check not supported
	Maximum number of single unibus	32
Physical characteristic	Demension	90×71.7×22.5mm(terminal not included)
		109.5×71.7×22.5mm(terminal included)
	Weight	0.075kg
	Installation method	2*35mm standard DIN35 slide rail
Environment	Working temperature	-25℃～70℃

characteristic	Restoring temperature	-40℃～75℃
	Ambient condition	surrounding temperature 40℃， relative humidity 95%
	Pollution	3
	Fire resistance	UL94-V0
	Protection level	IP20

Outline and installation dimensions and terminal signal definition：

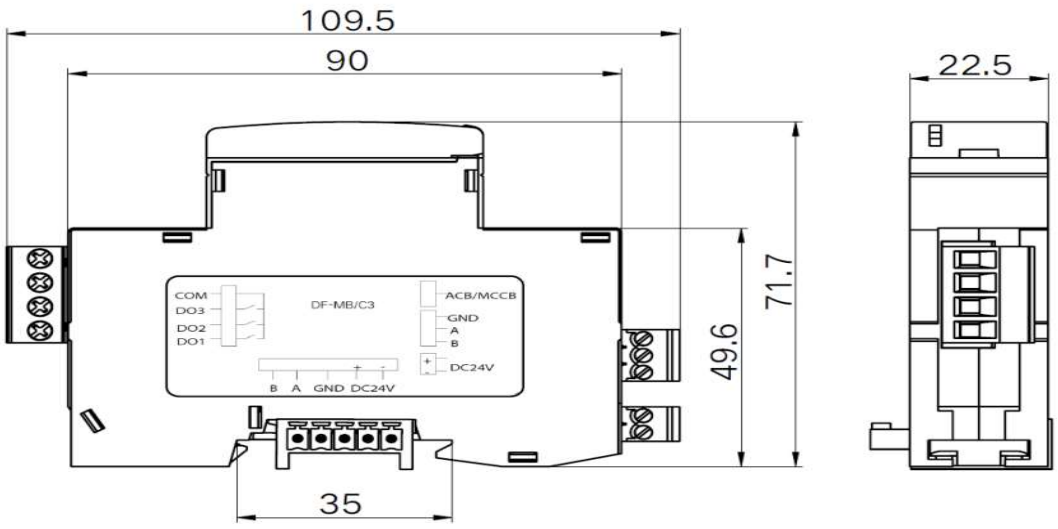


Fig.29 External Dimension of Communication Adaptor

Note: Unmarked tolerance level should follow GB/T 1804-c.

Definition of front knob and indicator light of communication adapter：

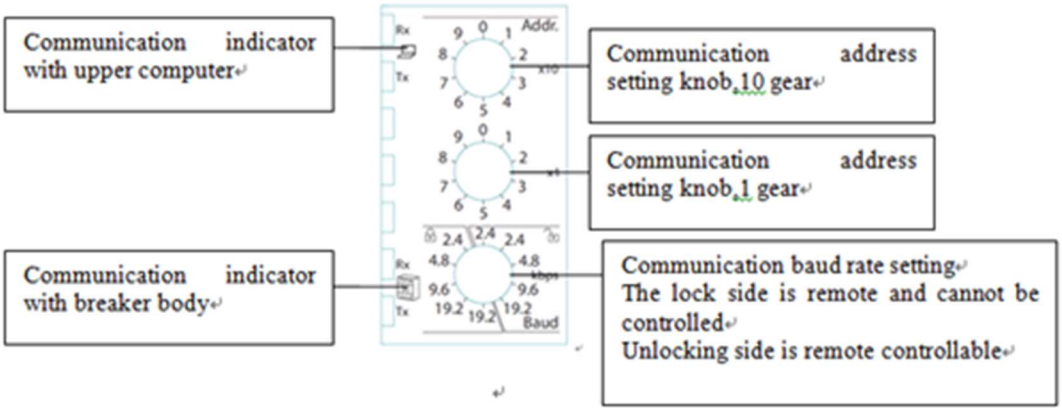


Fig. 30 Gear Adjustment of Communication Adaptor

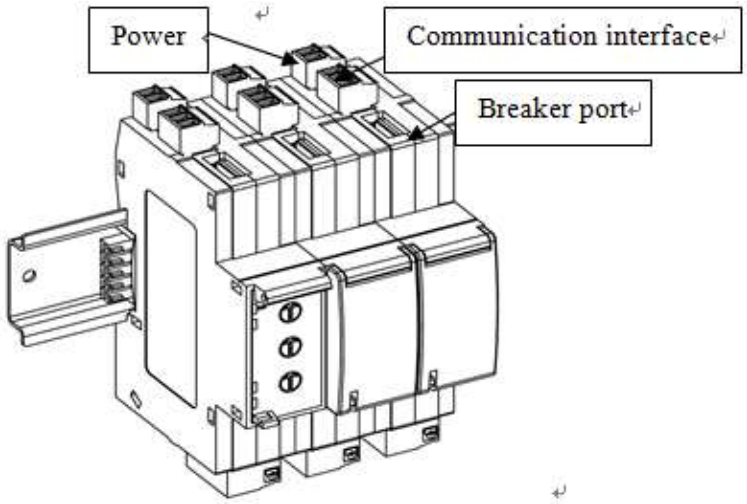


Fig.31 Terminal Ports of Communication Adaptor

Note:1.DO1~DO3 are three ways output control and can be customized the output functions. For example, the on/off control singal for motor operator.

2.Multiple numbers of adapters can be cascade installed (maximum 32). Each MCCB can set address(1~99), there are 2400,4800,9600,19200bps, four option for baud rate set.

3.When communication adaptor in temperature -35℃~-25℃, we suggest to decline baud rate to increase communication reliability.

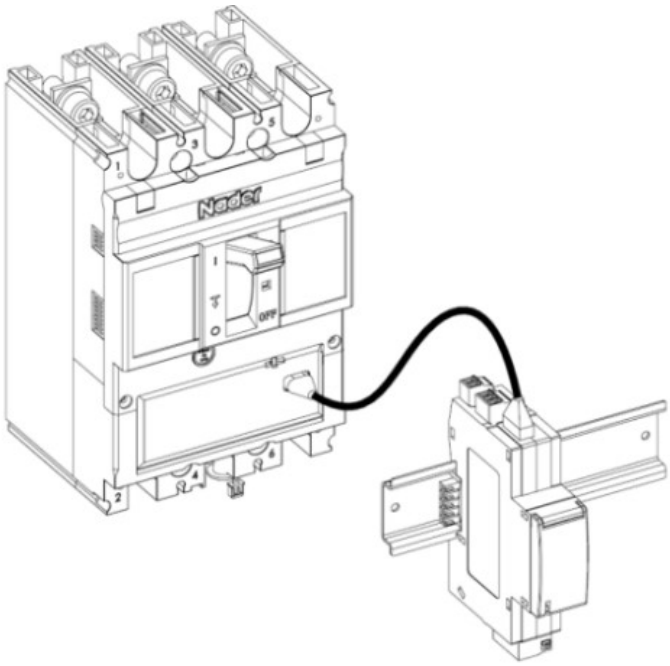


Fig.32 Terminal Ports of Communication Adaptor

9.6 DF-XS1 Display Module

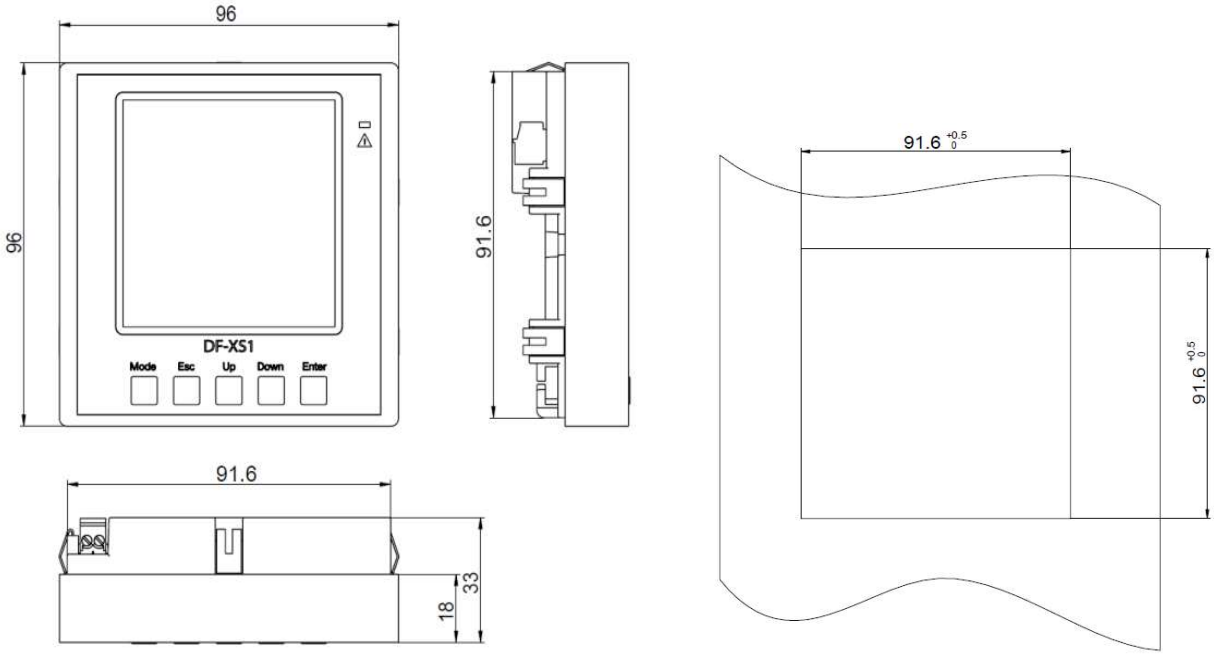
This module installs in the cabinet door. The opening of cabinet should be $91.6_{0}^{+0.5} \times 91.6_{0}^{+0.5}$.

Detailed operation should follow the instruction book if DF-XS1 display module.

The main parameters are as follows：

Table 33 Main parameters of Display Module

Common parameters for display module DF-XS4		
Electrical characteristic	Power supply	24VDC（19.2～28.8VDC）
	Power dissipation	40mA
Physical characteristic	Dimension	96×96×33mm
	Weight	0.22kg
	Display	160*160 pixel 、white back light
	Installation method	Horizontal installation (surface installation)
Environment characteristic	Working temperature	-25℃～70℃
	Restoring temperature	-40℃～75℃
	Ambient condition	Surrounding temperature40 ℃ ， relative humidity 95%
	Pollution	3
	Fire resistance	UL94-V0
	Protection level	IP20



Outline dimension drawing　　Schematic diagram of opening size

Fig.33 External Dimension for Display Module

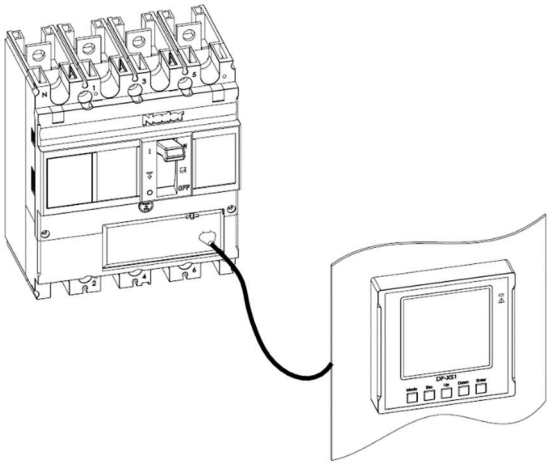


Fig.34 Display Module Connected to Product

Note: This module has four ports, can connect to four MCCB in the same time in order to set and display MCCB parameter。

Display module can't be selected with ETB-T,ETB-PT,ETC-T,ETC-PT circuit breaker at this stage。

9.7 DF-WK6 Temperature Module

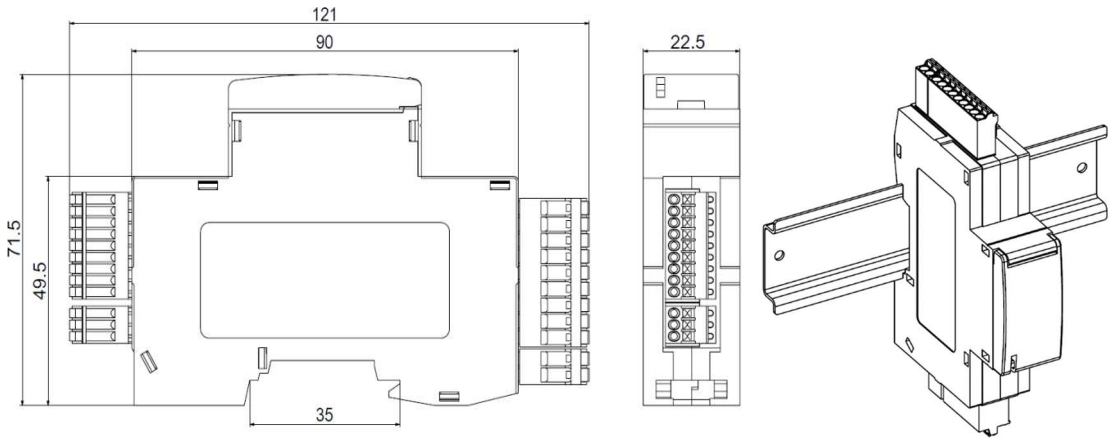
Table 34 Parameter of Temperature Module

Temperature alarm module common parameter		
Electrical characteristic	Power supply	20～55V(Wide voltage)
	Static power consumption	2.4W
	DO static power dissipation	250VAC/30VDC 2.5A Resistive load
	Measurable temperature range	0℃-150℃
	Temperature resolution	1℃
	Temperature accuracy	±3℃
Communication	Port	RS485，2 Modbus RTU
	Optional address	1~9
	Baud rate	2400/4800/9600/19200bps
	Check bit	CRC check odd-even check not supported
Physical characteristic	Dimension	90 x 71.5 x 22.5mm(without extended terminal)
		121x 71.5 x 22.5mm(with extended terminal)
	Weight	0.25kg
	Installation method	35mm standard DIN slide rail
Environment characteristic	Working temperature	-35℃～70℃
	Restoring temperature	-40℃～75℃

	Ambient temperature	Surrounding temperature 40 relative hunmiduty 95%
	Pollution	3
	Fire resistance	UL94-V0
	Protection level	IP20

Installing with standard DIN35 slide rail, outside dimension and installation dimension of single product shows as below. can be cascade installed. Temperature sampling points can be optional from 1 to 6 according to need. Each point can be monitored and have alarm output.

Note：When communication adaptor in temperature -35℃~-25℃, we suggest to declinebaud rate to increase communication reliability.



Outline dimension drawing Installation diagram

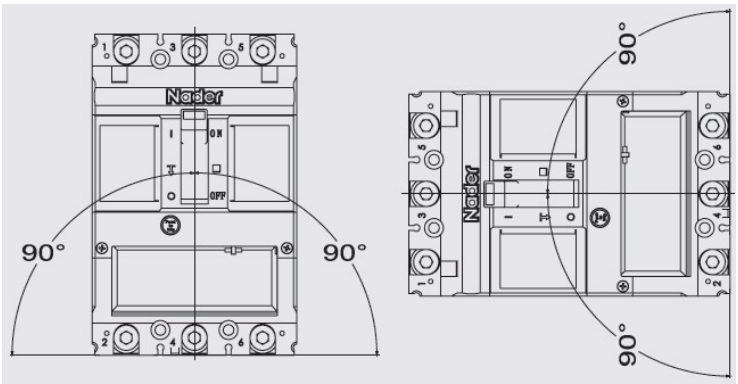
Fig.35 External Dimension of Temperature Module

Note: Unmarked tolerance level should follow GB/T 1804-c.

10、Installation direction of circuit breaker

For vertical installation of the product, the gradient between the installation surface and the vertical plane is no more than ±22.5°.

Horizontal installation of the product.



Vertical Installation Horizontal Installation

Fig.36 Mounting Method of Product

11、Packaging and storage of circuit breaker

Minimum packaging quantity: 1 piece/box. The packaged products should be stored in a warehouse with the air ventilation and the relative humidity no more than 80% when the ambient temperature is -40℃~+75℃. No acidic alkaline or other corrosive gas exists in the ambient air in the warehouse. Under the conditions above, the storage period shall be no more than three years since the manufacturing date.

12、Environment

The environment that comply with RoHS instruction.

13、Attachment Pachage List

Table 35 Accessories list form

S.N.	Name	Specifications	3P Quantity/Set	4P Quantity/Set
1	Cross small pan-head screw(s)	M5×110	4	4
2	Plain washer	M5	4	4
3	Spring washer	5	4	4
4	Hexagon nut(s)	5	4	4
5	Partition	——	4	6
6	Terminal screw	M10×30	6	8

14、Circuit breaker notes

1) Various characteristics and accessories of the circuit breaker are set in the factory. The circuit breaker, tripping unit or other accessories can only be adjusted, installed and maintained by the trained or qualified professionals according to the parameter requirements of the line design;

2) Ensure that the power supply is off before installing or removing any device;

3) The circuit breaker handle can be located in three positions, indicating three states: on, off and free tripping. When the handle is in the free tripping position, pull the handle in the off direction when the circuit breaker is connected and on.